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BOOK STACK AND SHELVING FOR LIBRARIES

DESIGNED BY BERNARD R. GREEN, C. E.



THE SNEAD AND COMPANY IRON WORKS
JERSEY CITY, N. J.

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REQUISITES OF A LIBRARY BOOK STACK. Every active library containing any considerable number of volumes requires an arrangement of shelving embodying all of the following features, namely:

- 1. Accommodation for books of every variety, size and kind of binding.
- 2. Shelves easily and quickly adjustable and interchangeable by any library attendant and readily and compactly stowed away close at hand when temporarily displaced.
- 3. Permitting every desirable classification, arrangement and rearrangement of the books at will.
 - 4. Affording free and instant access to any volume at any time.
- 5. Having not only certain main corridors, stairs and lifts for direct access to the books and for free communication both laterally and vertically throughout the stack in its several tiers, but readily yielding additional passages anywhere.
 - 6. Proper supports for books on partially filled shelves.
 - 7. Maximum capacity and capability of indefinite extension.
- 8. All surfaces permanently smooth and rounded to prevent injury to books or papers and protected from corrosion.
 - 9. Fireproof throughout.
 - 10. Thoroughly and safely illuminated by day and by night.
 - 11. Naturally clean and readily kept free from accumulated dust.
 - 12. Furnishing no lodgment or comfort to book pests.
 - 13. Immunity from injury from leaky roof or ceiling.
- 14. Even temperature and ventilation not only throughout the stack in general but through the individual shelves and their supports, so that practically the only obstruction to free circulation of air and light is offered by the books themselves.
- 15. Free, easy and direct communication at will in any direction throughout the stack for the convenience of attendants.
- 16. Convenience for all sorts of appropriate work everywhere in the stack, including direct access to books by readers when desirable as in the "open shelf" room, and the placing at convenient points of desks, cabinets, etc.
- 17. The fewest separate parts or pieces and the simplest construction consistent with strength and rigidity.
- 18. Location in close communication with reading, cataloguing and delivery rooms.

First Complete Bookstack System Installed in the Library of Congress ORIGINAL DESIGN. Until the construction of the great building for the Library of Congress was taken in hand for the shelving of millions of volumes of books, and the then rapidly increasing variety and bulk of library collections of all kinds, no system of shelving on a large, complete and thoroughly economical scale had been devised. Some small stacks had been built of combinations of iron and wood, but all were ill ventilated, very unequally warmed, dusty, close and overheated in their upper parts, inconvenient of access and poorly lighted.

Librarians were correspondingly dissatisfied and unhappy and the theory of shelving on the stack principle was consequently disapproved, and other schemes of single or of few tiers, with alcoves, etc., were attempted but found prohibitive in distances between parts, extent of administration, size of building and grounds, and therefore of cost of construction and maintenance.

Of the eighteen requisites of a complete and satisfactory stack system of shelving above enumerated, scarcely one was to be found in any existing library.

The problem was consequently new in almost all its elements. To solve it the needs of library administration were carefully studied and the results finally embodied in the system of shelving and stack construction which the Library of Congress, Washington, D. C., now contains and which has met the unqualified approval of all librarians.

It is this system of shelving devised by Mr. Green, the engineer in charge, which, with modifications and improvements up to date, adapting it to all modern requirements of libraries, large or small, public or private, is herein described and illustrated, as manufactured by The Snead & Co. Iron Works.

Other Systems Partial Copies and Inferior As stated, this system was the original design, on a comprehensive scale, of modern shelving for libraries. All other systems competing with it are makeshifts based on it but modified in minor details for the purpose of avoiding the patents and gaining the market.

None of them is an improvement, and all are, on the whole, inferior, because to reduce cost, certain details of the complete original have been omitted.

Harvard College Library Contained First Metallic Stacks HISTORY. The original of the modern metallic book stack was designed for the extension of Gore Hall, the Library of Harvard College, at Cambridge, Mass., in 1875.

It consisted of cast iron open work partitions or shelf supports and deck

framing, with cast iron perforated decks, and wooden shelves. This stack was copied in an extension of the Athenæum Library, Boston, and for that of the Army Medical Library, in Washington.

It was a distinct advance in compact permanent shelving in its day, but contained the comparative conditions of the architectural foundry work of the time. No other important advance had been made in economical, permanent, book shelving before the construction of the Library of Congress, begun in 1889, when the problem of the relatively mammoth stacks was presented. It was solved by Fireproof Stack Mr. Green, the superintendent of the construction, by the design and inventions Library of which were carried out as the stacks now stand in the building, after an exhaustive Congress consideration of the needs of libraries and the available new materials and resources of the foundry and architectural iron manufacture at that time. The ground was so completely covered that few material improvements in methods, materials, or cost, have since been made, although many manufacturers have undertaken it, in competition with the Green stack in the market, and great numbers of stacks have been built throughout this and other countries. The natural cause of this is the extreme simplicity of parts and the minimum of quantity and space occupied system Simple by the materials of construction attained, leaving the maximum of bulk avail- and Compact able for the books and reducing the cost to the lowest terms.

The original stacks in the Library of Congress, three in number, nine tiers in Capacity of height, containing forty-three miles of shelves with capacity for 2,000,000 volumes, Congress Stacks have been in constant and very active use for ten years without a hitch or com- 2,000,000 Volumes plaint of any kind. Not a shelf or other part of the great combination has given trouble, nor has any repair, however trifling, been needed and the whole is as perfect and serviceable as at the beginning.

These stacks have therefore naturally been the standard towards which all Other Systems designs have been aimed from the start, and they have never been outclassed in any Modeled After particular. This is not merely the judgment of the interested manufacturers but the disinterested opinion of all who have really learned and understood the subject.

Since the original stacks were built, the manufacturers, The SNEAD & Co. IRON Improvements Works, have introduced the several perfections in iron casting, connections, and Introduced beautiful workmanship that have been acquired in their manufacturing arts, so that their stacks of the present day contain material improvements.

Arrangement

GENERAL PRINCIPLES. Books are most advantageously shelved in double-faced parallel ranges. Radial ranges waste space. Glass or illuminating tile decks will serve to transmit strong sky light down through one or two tiers, but not more. In lofty stacks, therefore, side lights are indispensable and must be amply provided where daylight is to be depended on.

Must Have Side Light

High Stacks

Materials Fireproof All parts should be of fireproof material.

Requirements for Shelves Shelves about 9 inches wide, 3 feet long; thin as possible for strength and stiffness; uniform size and interchangeable; open work and light; quickly adjustable, but firm and practically immovable when in place; perfectly flat without flanges or projections; perfectly smooth all over, and free from sharp points or edges; durable and permanently safe from corrosion or injurious coatings.

Construction Uniform Throughout

Stack tiers uniform with and superimposed on each other, for greatest economy of space, interchangeability and convenience, besides best lighting and least expensive construction.

Tiers Seven Feet High Tiers about 7 feet from deck surface to deck surface.

Shelf Supports Compact Partitions or shelf supports thin as possible, in open work and perfectly straight, flat, and rigid.

Flooring Marble or Glass Decks of solid material—preferably white marble, next glass, partly for translucency. These give quiet decks.

Aisle decks solid from side to side.

Deck Slits

Range decks,—those between the shelf ranges—solid through the middle with a longitudinal slit or opening 5 inches wide along each side for light, ventilation, oral communication, safety of lower shelf books from injury by cleaning decks, moving trucks, etc., through between the ranges, and for saving in first cost of deck material.

Curb Angle

Slits in decks protected by half-inch curb from articles or litter on deck being pushed off.

Electric Lighting Best Day lighting irregular, unsatisfactory and often uneconomical. Tolerable for small stacks or cases of shelving.

Night use generally required making it indispensable to provide ample artificial lighting system. This often needed even in shelving used only in day time because of days darkened by clouds and short days of winter season in our latitude.

Electric lighting at hand, perfectly safe and of moderate expense, if turned on in the shelving only where and while actually needed.

The stack should be as nearly as possible a stack of books, with the least possible actual material of construction visible after the books are in place.

Therefore, of thin material and open work for ventilating; easy reach for construction dusting; poor lodgment for insects; communication between attendants; least boxed and Simple in and close, and most cheerful and airy for the attendants; fewest separate parts or pieces in construction; exposed surfaces white for reflection of light; shelves adjustable, to accommodate all kinds and sizes of books; ample artificial light under easy control. Maximum simplicity and minimum cost.

Quick intercommunication between parts and decks of stack, and with reading, Communication catalogue rooms, etc., by means of stairs, elevators, mechanical carriers, telephones, etc.

NONSTRUCTION OF THE BOOK STACK. As shown in figures 1, 2 Ranges Placed and 3, (pages 23-24-25) the shelving is placed in parallel double ranges, at right angles to the walls, which admit both the daylight and electric light directly into the passages between the ranges. The ranges rise, tier on tier, to any desired height, at intervals of seven feet from deck to deck. This is the most convenient average height for reading the titles and handling the books on the top shelf.

The shelf is of uniform size throughout the stack, and adjustable to any height. Its length and width may be made to suit the preference of librarians, three feet Shelves 3', o" by being the standard length, and eight or ten inches the width.

The double book range is therefore two shelves, or sixteen to twenty inches Ranges 4', 4" to wide. The passage between the ranges should be from three to three and a half 5'. 2" on centers feet, and the total center to center interval of ranges is therefore from four feet four inches to five feet two inches.

All tiers may thus be precisely alike in every detail, and the shelves adjustable Shelves Interchangeable and interchangeable throughout the stack.

The construction consists simply of cast iron skeleton shelf supports or uprights, Stack of Skeleton spaced the shelf-length apart, resting on the foundation and extending from deck to deck to the top of the stack. These partitions are steadied by attachment at top and bottom to the deck bars, which are the supports of the decks.

The deck bars are of steel bolted to the uprights at each deck level, and con- Floor Framing necting the rows of uprights. The latter are also connected to each other at the Uprights deck levels by flanged bars at right angles to the deck bars. All are connected continuously through the stack, both laterally and longitudinally, from wall to wall, into

which they are anchored, thus bracing the uprights at every story and preventing buckling in the lower stories from the weight of books and decks above.

Flooring Solid and Fireproof The covering of the decks may be thin slabs of any fireproof material, preferably white marble, rubbed above and polished underneath to reflect light. This covering is solid—without perforations or gratings—to prevent dust and litter from sifting through, but an open slit about five inches wide is left along each front of each book range for ventilation and light, and for conversation and the handing through, between decks, of books, papers, or other articles. This open space is of great value as a protection to the books on the bottom shelf from injury by the cleaning of decks, while it also saves expense in construction of the decks.

Deck Slits Necessary

A low flange is raised on the deck bar along this slit to prevent anything lying on the deck from being pushed off.

Diaphragms Necessary A sheet-steel diaphragm is placed in each range at each deck level to prevent dust from one story sifting down to the next, to prevent fire from running up, and to serve as a stepping plate for persons passing through any range from side to side when shelves are removed, and to avoid, when desirable, going around the range. It is also a stiffening web to the construction and serves as the bottom book shelf.

Large Window Area Needed Lighting. When the stack has side windows, each window may consist of a single pane of polished plate glass as wide as the passage between ranges, and nearly or quite the full height of the story or tier, permanently set air-tight into the opening at the head of each passage. Those exposed to direct sunlight may be provided with blinds of translucent glass or other material, such as brass wire gauze, operated in gangs from one or several points. The exterior surface of the window glass may be washed from skeleton galleries permanently provided on the walls, from a hanging seat which can be raised or lowered, or by a stream from a hose.

The artificial lighting should be by electricity only, with incandescent lamps. These may be of the "door-knob" or other pattern, snugly placed in the deck ceilings out of harm's way, diffusing the light throughout each range or corridor.

Shelves Best Supported at Four Points SHELF SUPPORTS AND SHELVES. The shelf partition or support is provided with a continuous row of blunt teeth on the front edge, and a corresponding row of horns or hooks on each side at the back to carry the shelves, which in turn are provided with lugs on their front corners and claw notches near

their back corners. This arrangement permits quick adjustment of shelves throughout the entire height of the tier, and also the placing of opposite shelves of the same range at any one level, making a through shelf of double width, also the placing of shelves close together if desired to receive a large volume or two lying flat.

There are no loose or movable pins, brackets, screws or other parts whatever. Shelves Compact The standing partition and the movable shelf comprise the whole outfit. At any Loose Parts point, the shelves, which are perfectly flat, like thin boards, may be removed and piled away at the top of the range, and leave all the space between the supports free for passage to and fro through the stack, or for any other purpose, such as the introduction of cabinets, etc.

The shelf itself is preferably an open grating of parallel bars of steel, the top shelf should surfaces being about one-half inch wide, spaced about one-quarter of an inch apart construction in the clear, and perfectly smooth. These are connected across at the ends by a bar containing the lugs and claw notches for support, and they are also "bridged" at one or two intervals between the ends by a small rod, as shown in figure 6, page 29. The shelf is the most complete and perfect made, or ever likely to be made. It is illustrated and described on pages 48 and 49.

All parts of the shelf and partition, with which books may come in contact, shelf should have are perfectly smooth all over and have a hard coating that will not wear off or injure Smooth Finish the bindings of the books.

It is evident that a shelf may be made of sheet metal or wood, even of slate or Other Materials glass if desired, that will take the place of the iron bar shelf here described, by simply providing the claw notch and the metal lugs on the front corners. The somewhat less expensive wooden shelf may therefore be used in this system of shelving as well as in any other, and may even be made with parallel longitudinal slits if desired, so as to possess many of the merits of the metal shelf, including the attachment for the same book support used on the steel bar shelf.

DOOK SUPPORTS. Taking advantage of the longitudinal spaces between The Simplest and the parallel bars of the shelf, a locking toggle, passing between and hooking Most Effective under the bars, is placed on the foot flange of a vertical metallic plate, which, while movable up to the last book on the end of the shelf, automatically locks itself in position against the books. This device is shown in figure 7, page 29.

It is extremely simple, durable and inexpensive, and yet the most convenient and reliable book support yet devised.

It has no loose or separate parts, may be used anywhere in the shelving, and may be instantly removed and stowed away when not needed. It goes equally well on top of the shelf, or, inverted, in position, on the bottom of the shelf for the support of books on the shelf below. This is particularly advantageous with tall books, by holding against their tops.

This support is as readily applicable to a solid shelf, either of wood or metal, if a slit be made three or four inches from the front edge to receive the toggle.

Secure Label Holder ABEL HOLDERS. Also utilizing the construction of the shelf a metal label holder is made to clamp over the first two bars at front of shelf, being entirely independent of the weight of books for holding in place. See figure 22, page 49.

ELEVATOR AND STAIRS. The stack may be provided with stairways, and with an elevator capable of lifting one or more persons with a truck load of books, and of being operated by the passenger.

Endless Chain Book Carrier BOOK CARRIER. In a suitable location, say the side of the elevator shaft, may be another shaft extending down to the basement, along which may run a closed box containing an endless chain or other suitable automatic book carrier, serving all of the stack decks and the terminal or delivery station. The carrier may be driven by power taken from the local steam, electric, or hydraulic plant, and running continually and quietly, transport with dispatch, books or other light matter both ways between the reading room and the stack without dependence on foot messengers. Such an apparatus, combined with the telephone, pneumatic tube, or other signal of any desired kind, does away with much of the fatigue and waste of time formerly unavoidable in the service of readers.

Indirect Radiation

HEATING AND VENTILATION. The stack is warmed and ventilated by radiators, preferably of warm water, and auxiliary fans located underneath in the basement. Sufficient fresh out-door air is admitted into this chamber through filters, whence it passes through the basement floor and circulates upward and downward in the stacks through the deck slits. Discharge outlets are provided at the roof, controlled by hand and by thermostats.

A IR CLEANING OR DUSTING. If stacks are kept closed with automatic Stack Dust Proof In swing doors, no dust will come in from outside, and only that produced by use of the stack and handling the books will have to be dealt with. Occasional removal of dust is possible by compressed or exhaust air methods.

TENERAL CONSIDERATIONS. The peculiar compactness and simplicity Stacks may be of of the construction and arrangement of this book stack renders it entirely feasible to carry it up an indefinite number of stories and thus utilize space and light generally unattainable on or near the ground. With proper foundation and supports the stack may be put on top of the building where light is plentiful, leaving the lower stories available for other purposes, even many of those of the library itself. The new stacks of the Congressional Library, which are nine stories or tiers in height, might as well have been nineteen if required. The quick and handy modern elevator, the automatic book carrier, the electric telephone, and pneumatic tube, etc., render the lofty book stack, as well as the lofty modern office building, equally useful and convenient in every part.

It is hardly necessary to mention that the low shelving of but one or two tiers in height, which is sufficient for the needs of small libraries, such as those of city districts, towns, smaller colleges, etc., is readily constructed on the same plan as the lofty stack.

HOW ALL THE REQUISITES OF THE PERFECT BOOK STACK AND SHELVING ARE EMBODIED IN THIS DESIGN. 1. The System Adapted uniformity in size of shelves, the ready doubling of their width at will, and their Books close adjustment to any desired height admit the shelving of books of any size or mixture of sizes whatever either standing on edge or lying flat, equally accessible and easily handled. If any shelf prove too wide, so that the books are liable to be pushed back out of sight, a wire or cord stretched behind and attached to the openwork partitions will hold them in place.

2. The shelves are all precisely alike, made from one and the same pattern, Shelves Easily and may be removed or dropped into place almost as quickly as a book can be. Adjusted Any one or any number of the shelves may be removed, even while full of books, if the books be not too heavy, readjusted or interchanged, at any moment without the slightest interference with any other shelf or its contents.

This is rendered feasible, expeditious and convenient by the absence of anything to be adjusted to receive the shelf or any catches, pins, or other movable supports for which one must search or feel. All annoyance of dropping movable pieces on the floor or down among the books is entirely avoided.

No shelf can slip off or tilt on its bearings. It may even be shifted with one hand while the other is otherwise occupied. Moreover, no shelf can be dislodged by any force from below or lifted off its bearings more than about three-eighths of an inch, because it is then stopped by the next tooth above on the support.

System Adapted to Any Classification 3. The shelves, once arranged for any particular classification of books, may be quickly and easily rearranged and shifted for any other.

All Books Accessible

- 4. Every book can be reached or its title read, without climbing or stepping above the floor or deck.
- 5. The main corridors of the stack room, the stairways and lifts, afford access to the books and free communication throughout the several tiers, and additional passages can be secured through the ranges themselves by merely removing the shelves.

Book Support

6. The book support or brace as applied to these shelves is by far the best ever devised. It depends solely upon its own shelf for attachment, is entirely independent of the spaces between shelves or the sizes of books, and is quickly and universally adjustable on any part of the shelf. It may face either way, and a pair of them may be so placed as to isolate a few books in the middle of the shelf. It may also be attached to bottom of a shelf and hang downward, to secure the tops of the books on the shelf below. It is equally applicable and useful on wooden shelves.

Maximum Capacity Secured

7. It is evident from the illustrations that a maximum of capacity and of indefinite vertical extension of the stack are secured by the general system described. On account of the minimum of space occupied by the shelf supports a saving in book storage capacity of 5% or more is made compared with most other systems.

Cleaning Simple

8. The simplicity of form and surface of the shelves and shelf supports, the only parts of the construction with which the books come in contact, render them very simple to polish and keep clean.

Thoroughly Fireproof 9. The construction entirely and economically avoids the use of any combustible material whatever, and also every connection with anything to cause fire, through the warming or the artificial lighting apparatus or otherwise.

Open Construction Diffuses Light 10. It is evident from the accompanying illustrations of the Congressional Library stacks that the location and sizes of the windows, in connection with the

spacing and arrangement of the ranges and shelving, are such as to admit ample daylight to all parts of the shelving, even when filled solidly with books. As it seldom occurs, however, that some unfilled spaces do not exist on or between the shelves, the open skeleton construction of this system of shelving adds materially to the penetration and diffusion of light. The same is greatly enhanced also by the deck slits through which a great deal of light comes obliquely down directly from the sky through every upper window in the same range on both sides to the top of the stack. White marble decks and ceilings still further increase the illumination by reflection, and the stacks are well lighted at night by incandescent ceiling lamps in the aisles.

11. Dust is excluded by sealed windows, and by filters for the air admitted Exclusion for ventilation. That which may be brought in with the books or otherwise, or which is produced by handling the books, is of small amount. The permanently sealed windows are an absolute security against damage from thunder showers, and from winds or gusts laden with dust or moisture.

- 12. The open grating of the shelves prevents the deposit of dust upon them, No Enclosed and therefore its accumulation at the back of the shelf, whence it is pushed by the books, as occurs with solid shelves. Roaches and other pests find on such a shelf but poor lodgment and much more light and air than they enjoy, while the books themselves, especially those much used, are benefited by the superior ventilation afforded.
- 13. The top tier of each shelf range is capped with a flanged sheet steel plate, Books Protected which will shed any water that may leak through the roof or floor above, and thus secure the books at all times from such a source of injury.
- 14. By means of the deck slits, so evenly and liberally distributed throughout Uniform the stack, the open spaces through the decks at the window recesses, the extensive Secured surface of window glass, and proper adjustable openings in the ceiling and lower floor, an ample circulation of air and nearly uniform temperature are secured throughout the stack. In very lofty stacks, a fan here and there may be needed in some situations, in summer weather.
- 15. By removing the shelves from any range section a free and direct passage Passage Through is made through from range to range, which may be extended the entire length of Ranges the stack.

The deck slits or slots in front of the ranges, being about five inches wide, are

most convenient for attendants to talk through to each other, even through several stories, and to pass books or other small articles through from deck to deck either above or below.

Deck Slits Protect Books Books may be shelved as low down as the floor or deck level without danger of injury to the bindings from sweeping or washing of the deck or of abrasion from passing trucks, because effectually guarded by the raised curb and intervening slot in the deck.

This convenience is wanting in the continuous deck, and the slits are unobjectionable. Articles are very rarely, if ever, dropped through, and then will never fall more than one story, while it is impossible for a person to step through without special effort. It has also been proved by experience that the deck slit does not expose attendants on one of the upper decks to the view of those below.

System Adaptable

16. The open arrangement of the framework permits the use of any range section or any number of them at any time for catalogue cabinets, closets, cases of drawers, small desks or tables, etc. The simple removal of the shelves renders these spaces thus available at a moment's notice.

Window Seats

Every window in the range passages may contain a spacious permanent seat, in the full light, suited for the accommodation of the attendants or of special students who may be admitted to the stack.

Book Ledges

A ledge of six inches or more in width may readily be hung on the front of any book range, as a rest, and be quickly removed at will. The front teeth of the shelf supports furnish convenient and adjustable attachments for this purpose (fig. 5, page 27).

Movable tables running on casters may also be used in the corridors.

Construction the Most Economical 17. It is believed to be impossible to devise a construction simpler in every sense of the word, or more economically manufactured and installed, than that here described, fulfilling the essential requisites of either a large book stack or a small system of shelving in one tier.

The cost in any case cannot exceed that of any other design for a good quality of workmanship and materials. At the same time the design lends itself to any degree of ornamental and elegant treatment that may be desirable for conspicuous or special locations.

All Departments Connected 18. The automatic book carrier, elevator, pneumatic tube, and telephone furnish quick and direct communication between the stack and the reading or cataloguing rooms.

CHELVING FOR SMALL LIBRARIES AND BOOK CASES. Reference to D figures 24, 25, 26 and 29 will show how the shelves and supports, used for the large library or book stack, are entirely suited to any desired arrangement of Shelving Adapted shelving on a smaller scale, without loss of any of the advantages possessed by stack Libraries shelving.

The framework may be bolted together so as to be knocked down for removal, and the several parts, being chiefly bars and flat castings, of but few shapes and sizes, snugly packed into the smallest compass.

Book shelving must always be pretty much the same thing whether in the form of a small book case, a small one-story library, or a book stack of any extent. Most of the parts, therefore, will be of standard shapes and sizes.

TENERALLY. The adaptability of a properly designed book stack is as universal as the possibility of storing any large quantity of books in a classified and accessible arrangement. This is apparent on examination of the Green system of shelving. It can be placed anywhere, in single or double-faced arrangement; is readily carried by floors or foundations of any sort, because its weight is uniformly distributed over the area and there are no important concentrated load points. This Stacks can Carry incidentally renders the stack a most economical support itself of stories and roof Above Floors or Roof above, if desired.

The main reading room floor of the new great Public Library of New York rests directly on the book stack, seven tiers in height, just beneath it.

This stack structure is also so inconspicuous of itself, due to its light, skeleton form, that, when filled with books, practically nothing is visible but solid tiers of books with decks between them, forming a real stack of books.

It is, moreover, a self-sustaining structure and needs essentially but a foundation or floor to stand on, or even to be suspended from, if that were desirable in any case. The walls and roof, as for an ice house, are needed only for protection from the weather and practically not at all for support.

Such a structure is a true book stack.

True Book Stack

It is built within a building and is not necessarily any part of it, - merely its furniture or content.

Its minimum internal dimensions and relations of parts are determined by the sizes of the books and the stature of the persons who use it. A newspaper or map

stack would be different internally from a stack for the ordinary sizes of books because the material to be shelved is more bulky.

With electric illumination under convenient control, daylight is no longer indispensable and the stack may be located anywhere and be of any dimensions, regardless of daylight or exposure to fire.

Daylight not

Indispensable

The location is thus no longer a serious architectural or administrative question, and the Green stack easily lends itself to the solution of every problem of this nature.

The undersigned are fully prepared to manufacture the book stacks, shelving, and book supports above described, and to submit designs and estimates for adapting them to any situation where fireproof, or even semi-fireproof construction (iron framework and supports with wooden shelves) is required.

Correspondence is solicited from architects, trustees of libraries, or librarians, contemplating the erection of new libraries, or the modification or enlargement of existing shelving or book stacks.

THE SNEAD & CO. IRON WORKS

(Incorporated)

JERSEY CITY, N. J.

PARTIAL LIST OF LIBRARIES USING THE GREEN SYSTEM OF BOOK STACK AND SHELVING

LIBRARY OF CONGRESS

WASHINGTON, D. C.

SMITHMEYER & PELZ AND EDWARD P. CASEY, ARCHITECTS

NEW YORK PUBLIC LIBRARY
NEW YORK CITY
CARRERE & HASTINGS, ARCHITECTS

CONVERSE MEMORIAL LIBRARY
MALDEN, MASS.
SHEPLEY, RUTAN & COOLIDGE, ARCHITECTS

CARNEGIE PUBLIC LIBRARY
WASHINGTON, D. C.
ALBERT RANDOLPH ROSS, ARCHITECT

LELAND STANFORD JR. UNIVERSITY LIBRARY
STANFORD UNIVERSITY, CAL.
CHARLES EDWARD HODGES, ARCHITECT

CARNEGIE PUBLIC LIBRARY
SYRACUSE, N. Y.
JAMES A. RANDALL, ARCHITECT

PUBLIC REFERENCE LIBRARY

TORONTO, ONTARIO

WICKSON & GREGG AND A. H. CHAPMAN, ARCHITECTS

KRAUTH MEMORIAL LIBRARY
LUTHERAN THEOLOGICAL SEMINARY, MT. AIRY, PHILADELPHIA, PA.
WATSON & HUCKEL, ARCHITECTS

LOUISVILLE FREE PUBLIC LIBRARY
LOUISVILLE, KY.
PILCHER & TACHAU, ARCHITECTS

PORTLAND PUBLIC LIBRARY
PORTLAND, ME.
F. H. FASSETT, ARCHITECT

Y. M. C. A. LIBRARY
NEW YORK CITY
PARISH & SCHROEDER, ARCHITECTS

PARLIAMENTARY LIBRARY
WELLINGTON, N. Z.
JOHN CAMPBELL, GOV. ARCHITECT

MASONIC LIBRARY
BOSTON, MASS.
LORING & PHIPPS, ARCHITECTS

AMERICAN SOCIETY OF CIVIL ENGINEERS

NEW YORK CITY

C. L. W. EIDLITZ, ARCHITECT

KANSAS STATE AGRICULTURAL COLLEGE

MANHATTAN, KAN.

SEYMOUR DAVIS, ARCHITECT

NEW HAMPSHIRE STATE LIBRARY
CONCORD, N. H.
A. P. CUTTING, ABCHITECT

BLACKSTONE MEMORIAL LIBRARY
BRANFORD, CONN.
S. S. BEMAN, ARCHITECT

INDIANA STATE NORMAL SCHOOL
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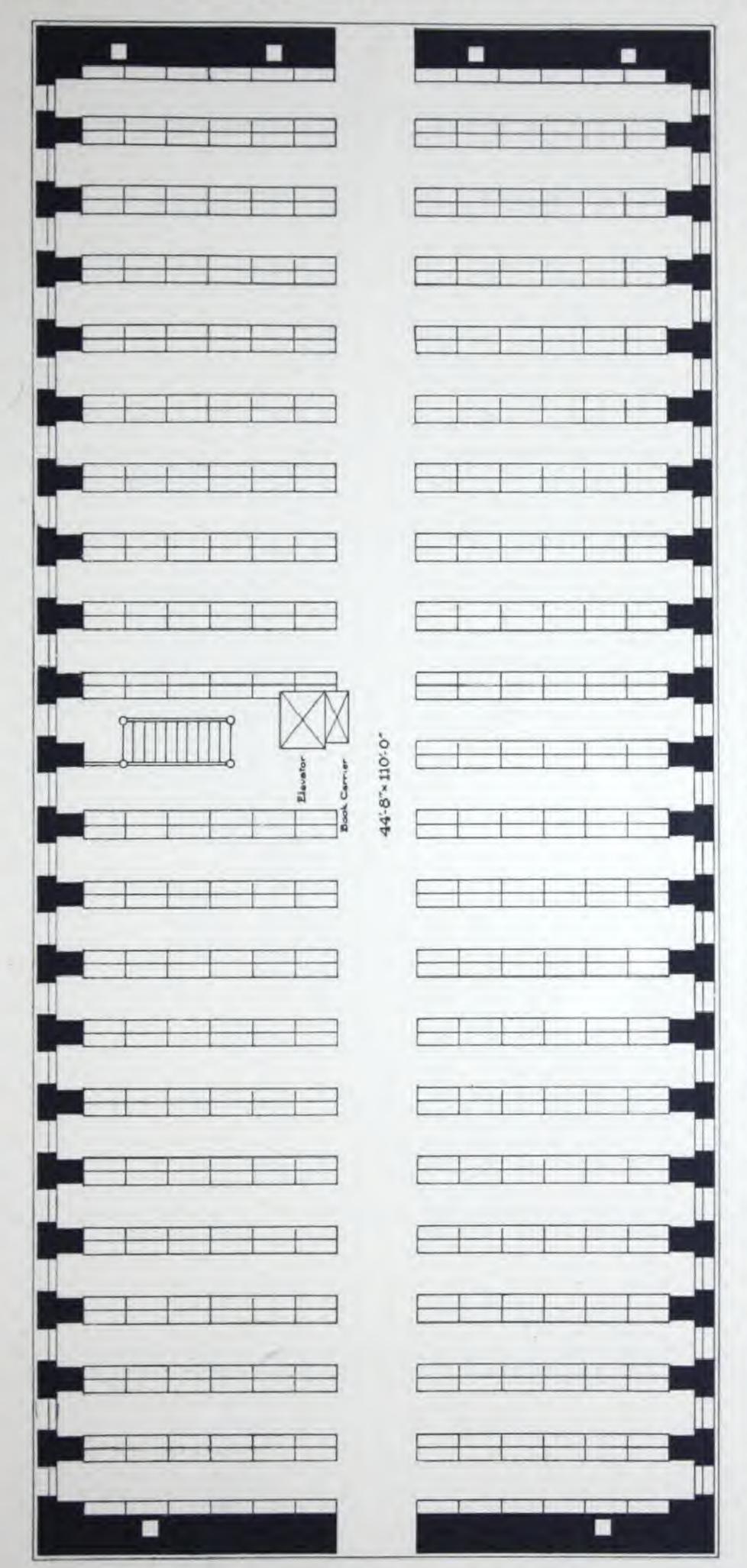
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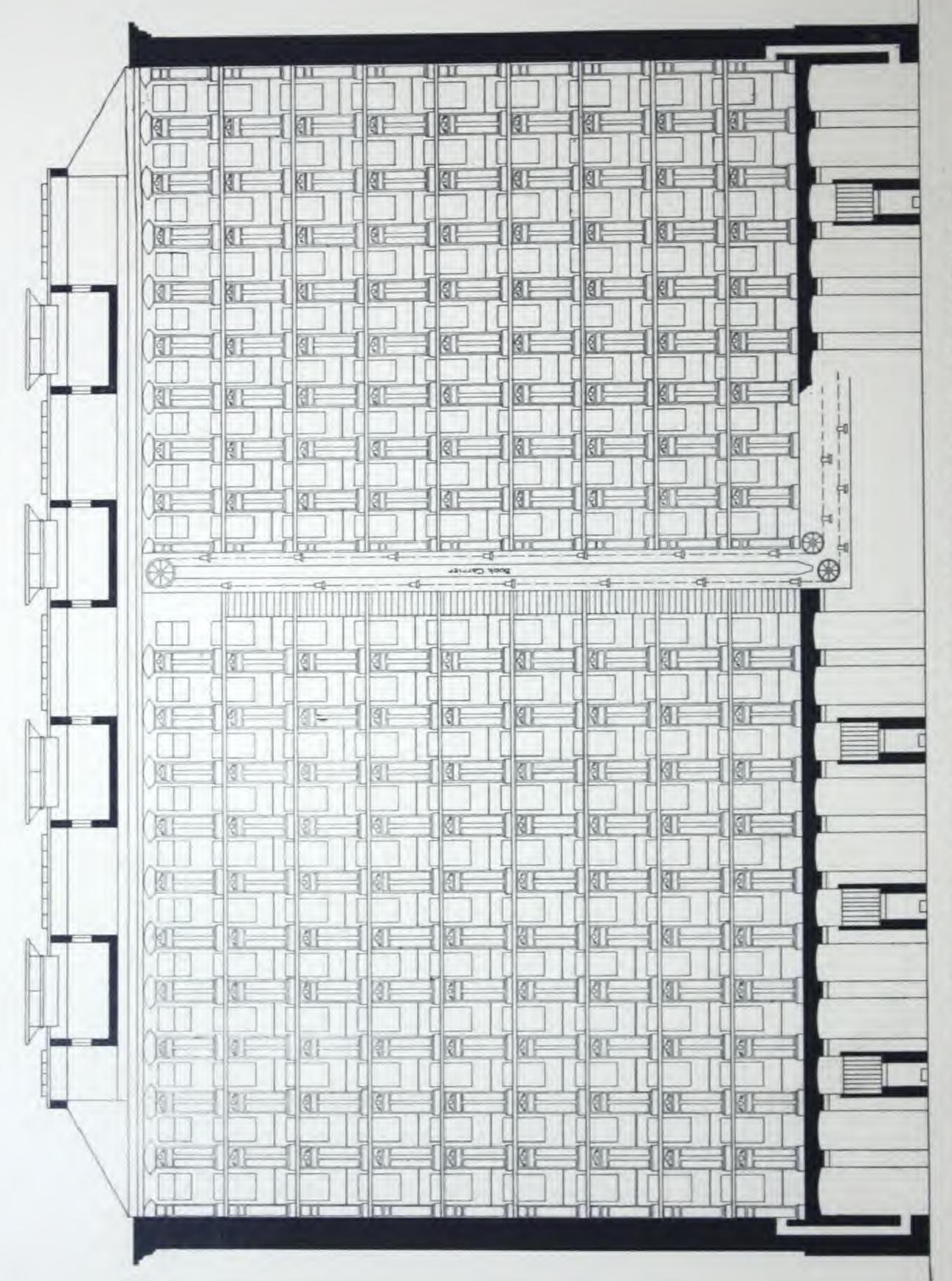
(Figures 1, 2 and 3)

THESE general drawings of the North Stack, Library of Congress, are referred to in the preceding pages and illustrate a typical arrangement of the bookstack for a large library. Additional stairways and book lifts can be introduced if found desirable.

A number of typical library plans will be found in the pages following.

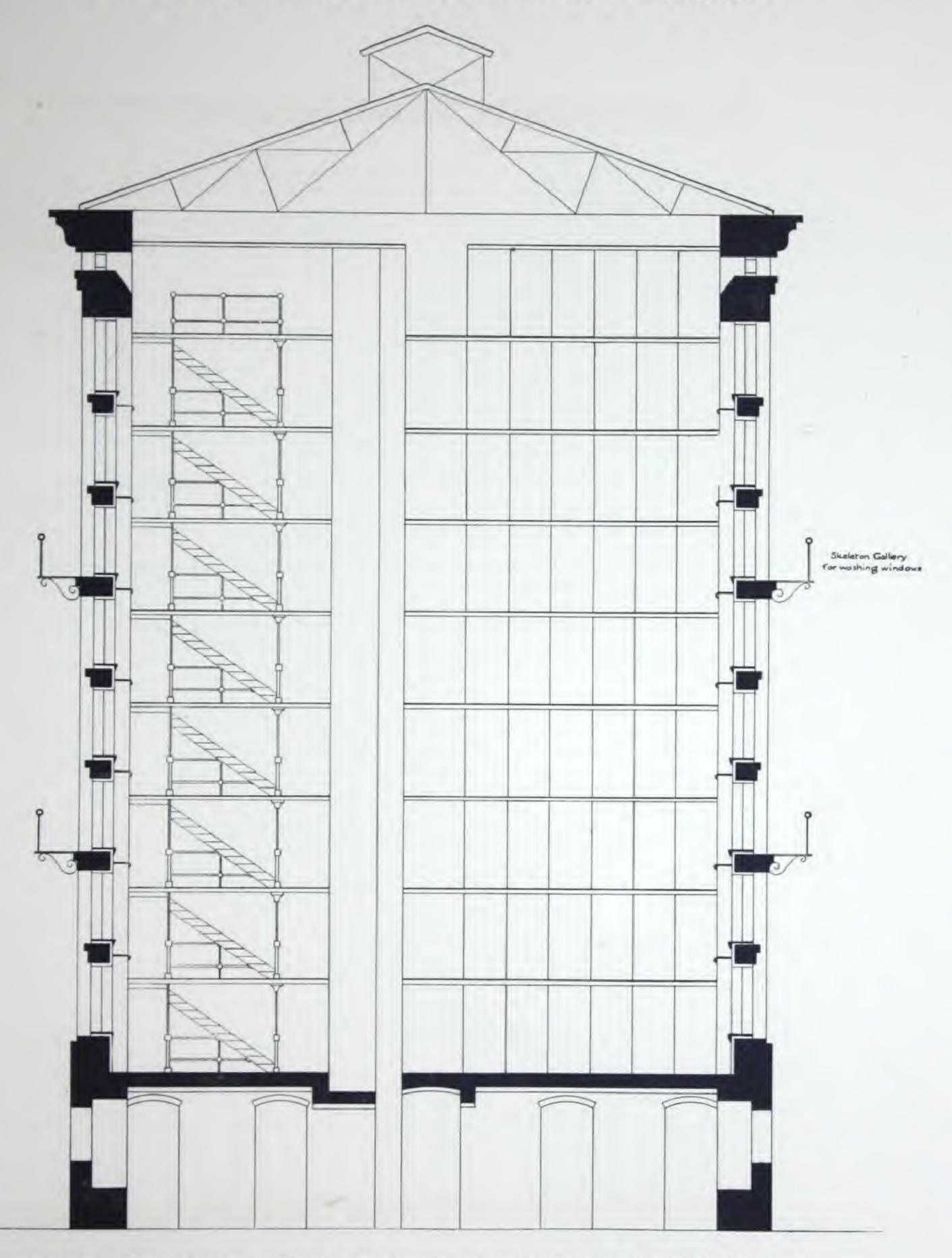


PLAN OF THE NORTH STACK, LIBRARY OF CONGRESS, WASHINGTON, D. C. (Figure 1)



LONGITUDINAL SECTION OF THE NORTH STACK, LIBRARY OF CONGRESS, WASHINGTON, D. (Figure 2)

[24]



CROSS SECTION OF THE NORTH STACK, LIBRARY OF CONGRESS, WASHINGTON, D. C. (Figure 3)

RANGE FRONT AND INTERMEDIATE SHELF SUPPORT

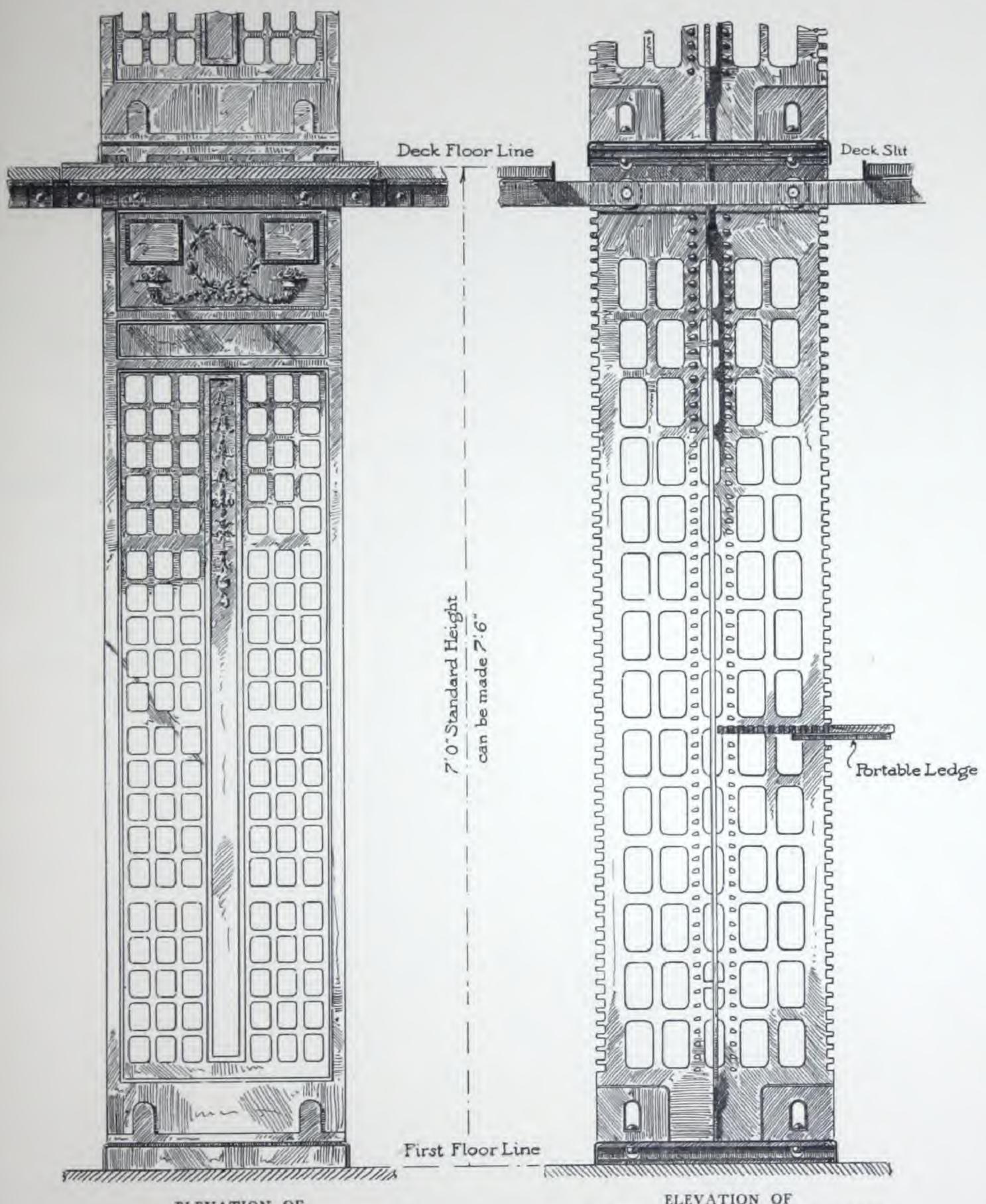
(Figures 4 and 5)

THESE illustrate the typical supports for 10-inch shelves, the end support being called a range front. Each support is of a single thickness of cast iron, perforated as shown, and the range front may be ornamented to suit the taste of the architect; see also figures 9, 17 and 19. Cast iron is the most important and the most necessary of all productions in metal. Its uses are multifarious, from the heavy structural parts in buildings, engines and machines to the beautiful and delicate architectural forms that adorn the interior and exterior of our finest edifices.

The standard tier height is 7 ft. 0 in. from floor to floor, this being the limit for easy reaching of books and reading of titles on the upper shelves. The tier can be made 7 ft. 6 in. high if desired.

In figure 5 the horns for supporting the back of the shelf are shown cast on the shelf support; these can as well be of steel and placed on the vertical stiffening rib of the support; see also figures 13 and 15.

For half-tone illustration of a range with shelf supports shown in figures 4 and 5, see figure 25.



ELEVATION OF 20" RANGE FRONT FOR 10" SHELF (Figure 4)

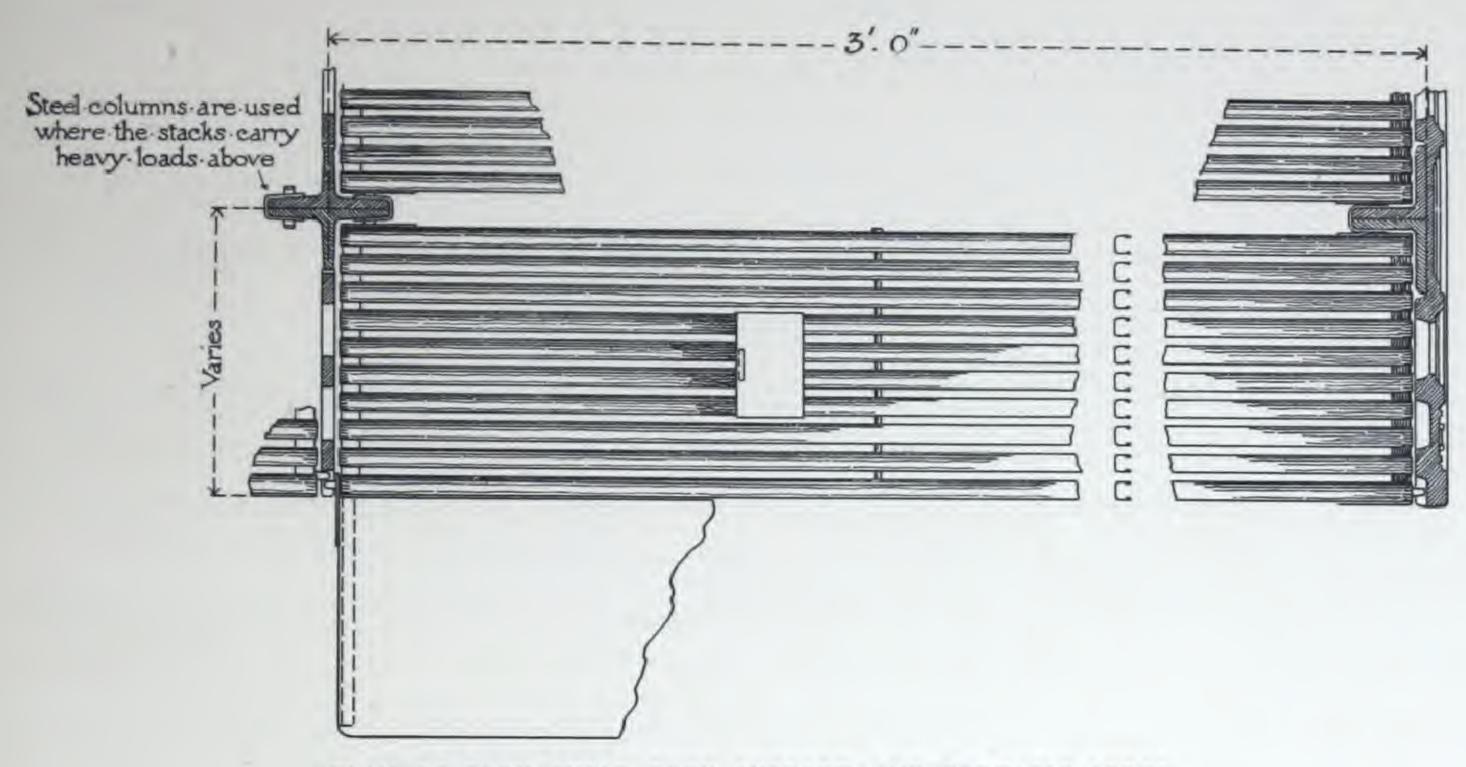
ELEVATION OF 20" SHELF SUPPORT FOR 10" SHELF (Figure 5)

SKELETON SHELF, BOOK SUPPORT AND PORTABLE LEDGE

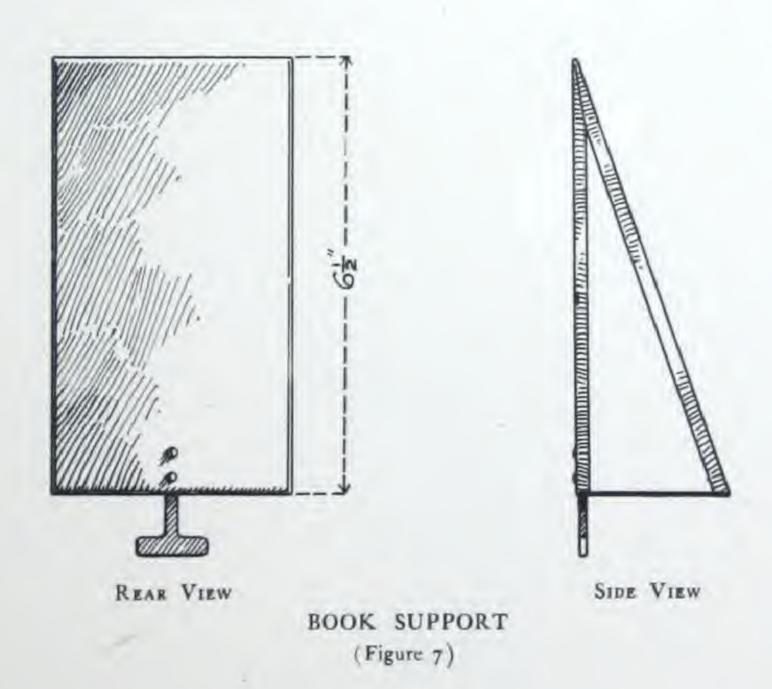
(Figures 6 and 7)

THE mechanical construction of the shelf and book support are shown generally. For complete description of the shelf see page 48, and for half-tone illustrations see figures 21 and 22.

In figure 6 a steel column is shown in connection with the shelf support; this construction may be employed when the stack is unusually high or carries heavy loads above it.



PLAN OF BOOK SHELF, BOOK SUPPORT AND PORTABLE LEDGE (Figure 6)



PLAN OF DECK AND RANGES

(Figure 8)

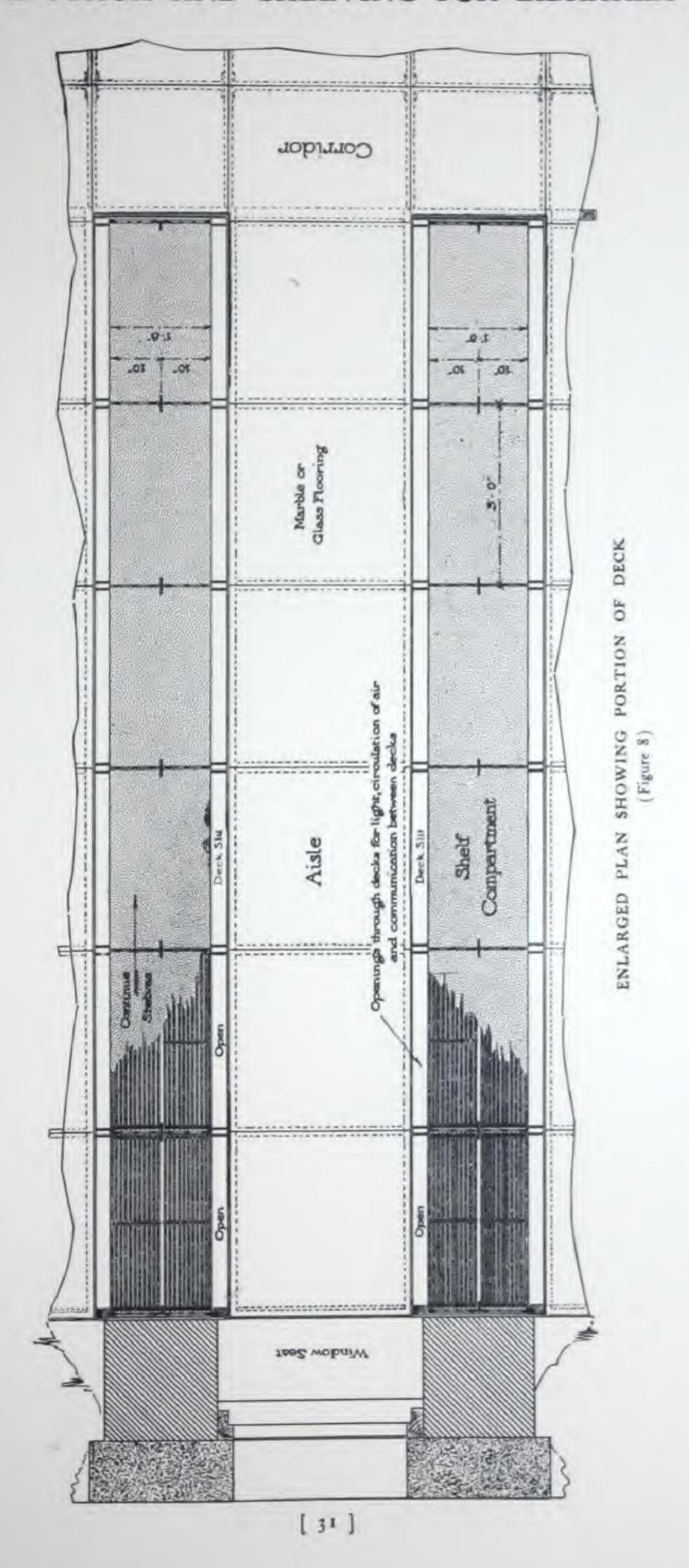
THE relative positions of shelf supports, shelves, corridor, aisle, deck slits and window seat are shown in this enlarged plan.

The shelf supports are but 7/16 of an inch thick and thereby consume a minimum amount of space, resulting in a maximum book storage capacity for our stack; being the full depth of the shelf compartment the supports brace the end books and the shelves are carried at their extreme outer corners.

The shelves are not more than 34 of an inch apart at their back edges, this prevents small books from falling between and makes a through shelf for large books where opposite shelves are placed at the same level.

Deck slits are usually 4 or 5 inches wide; they afford circulation of air and communication between decks, effect a saving in the cost of marble or glass flooring, and their curb angles prevent damage to books on the lower shelves from the feet, book trucks or the mopping of deck floor.

See also figures 19 and 20.



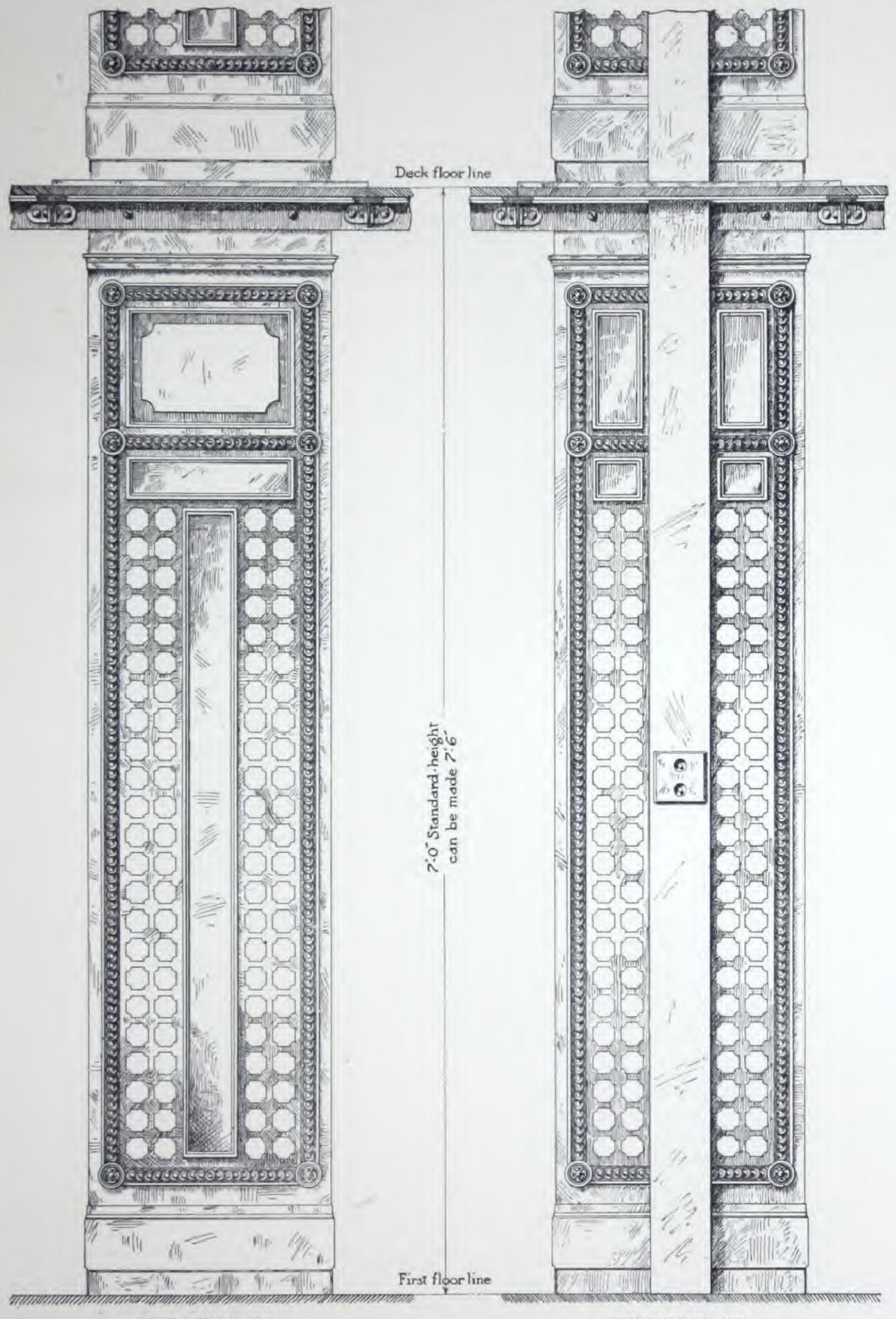
RANGE FRONTS

(Figures 9 and 10)

THE designs shown here can be furnished if preferred to figure 4, or architects can make their own design. The narrow panel near the top can be made movable so as to be used as a card frame.

Where it is desired to have separate control for the electric lights in each aisle between the ranges the vertical conduits and switch box may be carried up concealed in the sheet steel duct shown in figure 10; these ducts are removable. A more economical method of controlling the aisle lights is by means of hanging tassel switches which do not require the iron ducts.

For half-tone illustration of a range with front as shown in figure 9, see figure 24.



ELEVATION OF 20" RANGE FRONT FOR 10" SHELF (Figure 9)

ELEVATION OF

20" RANGE FRONT FOR 10" SHELF

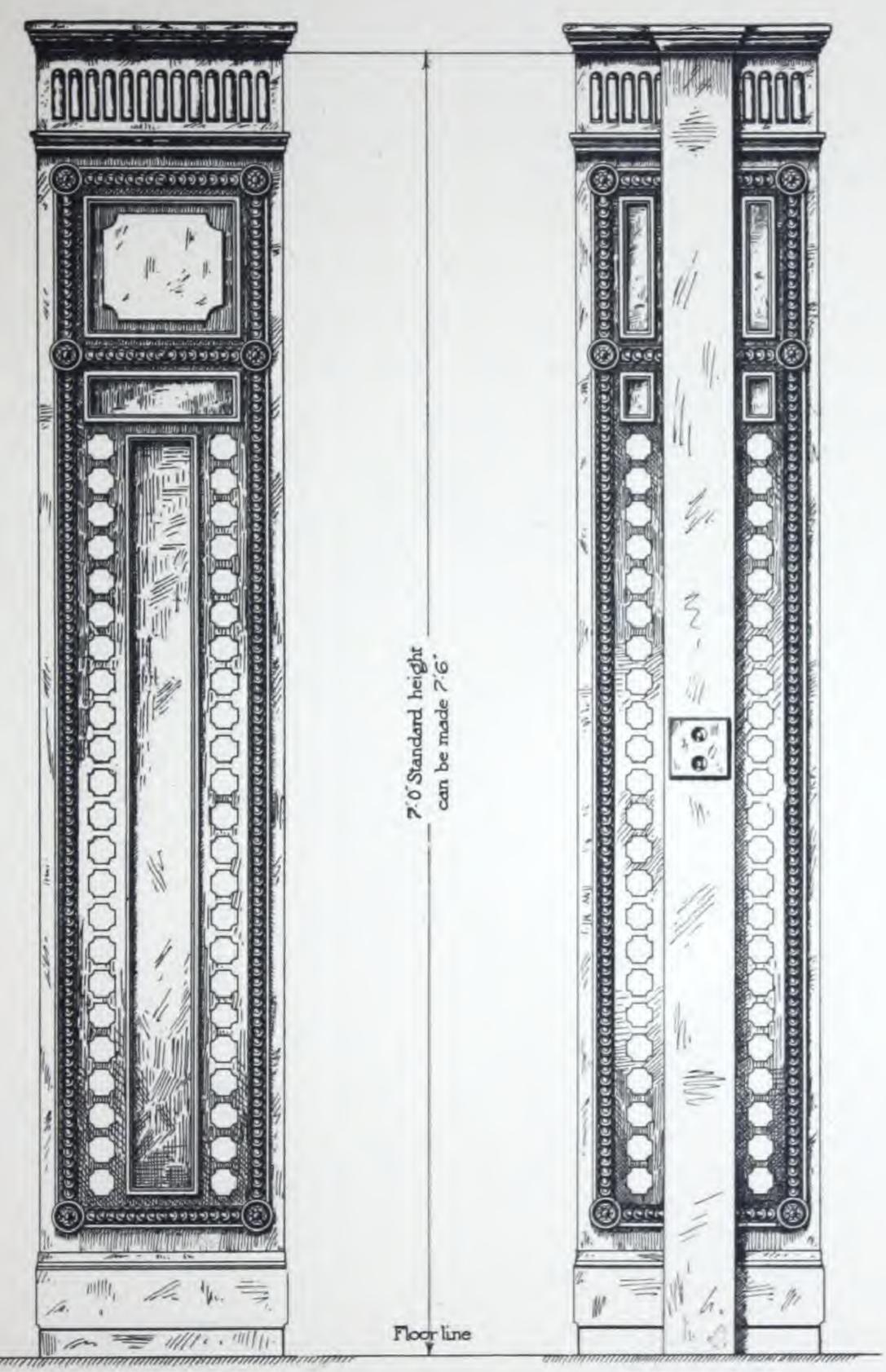
SHOWING DUCT FOR ELECTRIC WIRES

(Figure 10)

RANGE FRONTS

(Figures 11 and 12)

THIS design is similar to figures 9 and 10, but is shown adapted to an 8-inch shelf and only one tier high with cornice. For stacks of two or more tiers the upper tier is finished as here shown.



ELEVATION OF 16" RANGE FRONT FOR 8" SHELF (Figure 11)

ELEVATION OF 16" RANGE FRONT FOR 8" SHELF SHOWING DUCT FOR ELECTRIC WIRES (Figure 12)

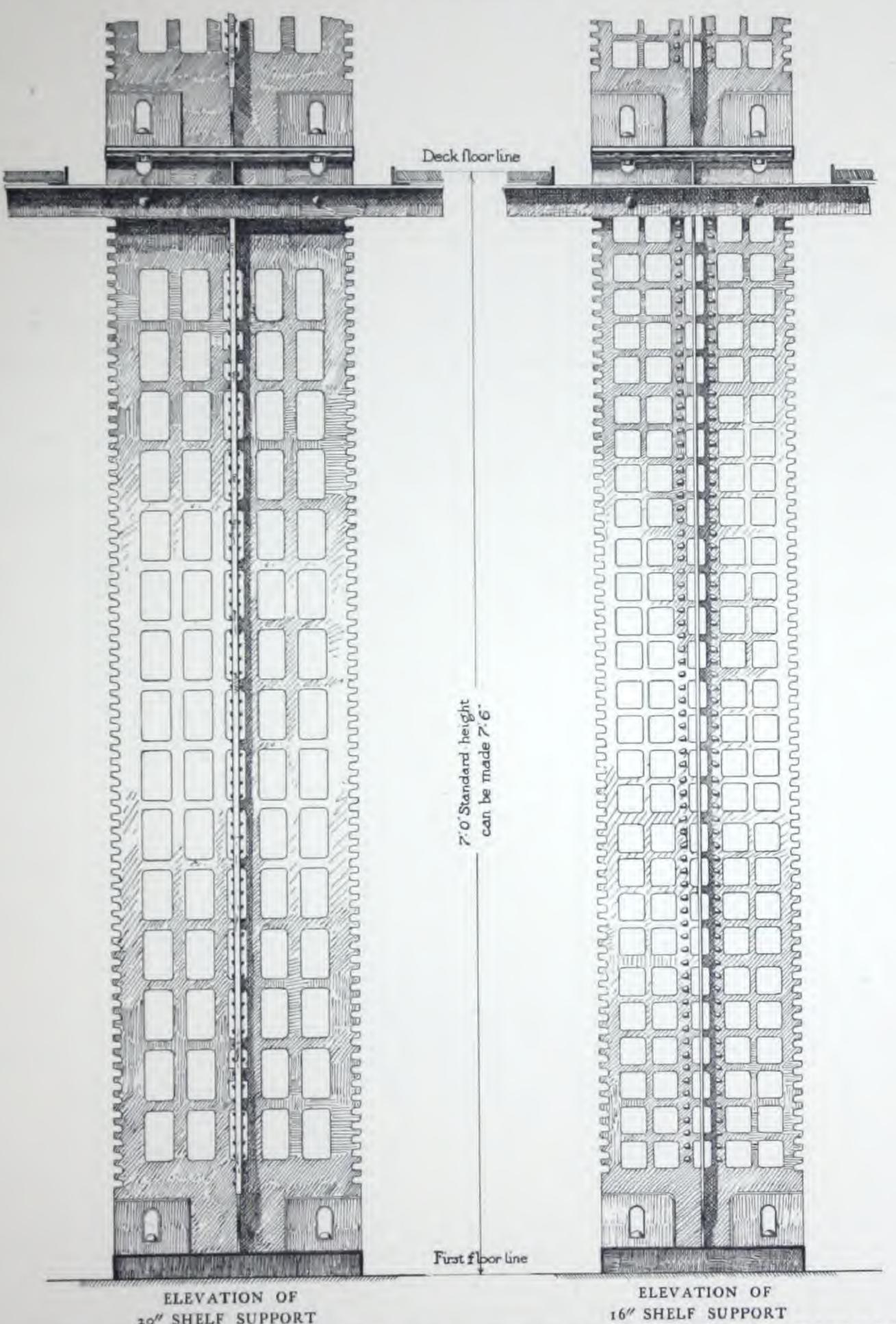
INTERMEDIATE SHELF SUPPORTS

(Figures 13 and 14)

THE 20-inch shelf support, figure 13, is similar to that shown in figure 5 except that the shelf-supporting horns are made of steel and placed on the stiffening rib of the shelf support. See figure 15.

The shelf support for eight-inch shelves is here shown with the cast iron horns (see also figure 16), but the steel construction can be used as well.

For half-tone illustrations of intermediate shelf supports in a range see figures 24 and 25.



20" SHELF SUPPORT

SHOWING SMALL STEEL SUPPORTING HORNS AT BACK OF SHELF (Figure 13)

SHOWING SMALL CAST IRON SUPPORTING HORNS AT BACK OF SHELF (Figure 14)

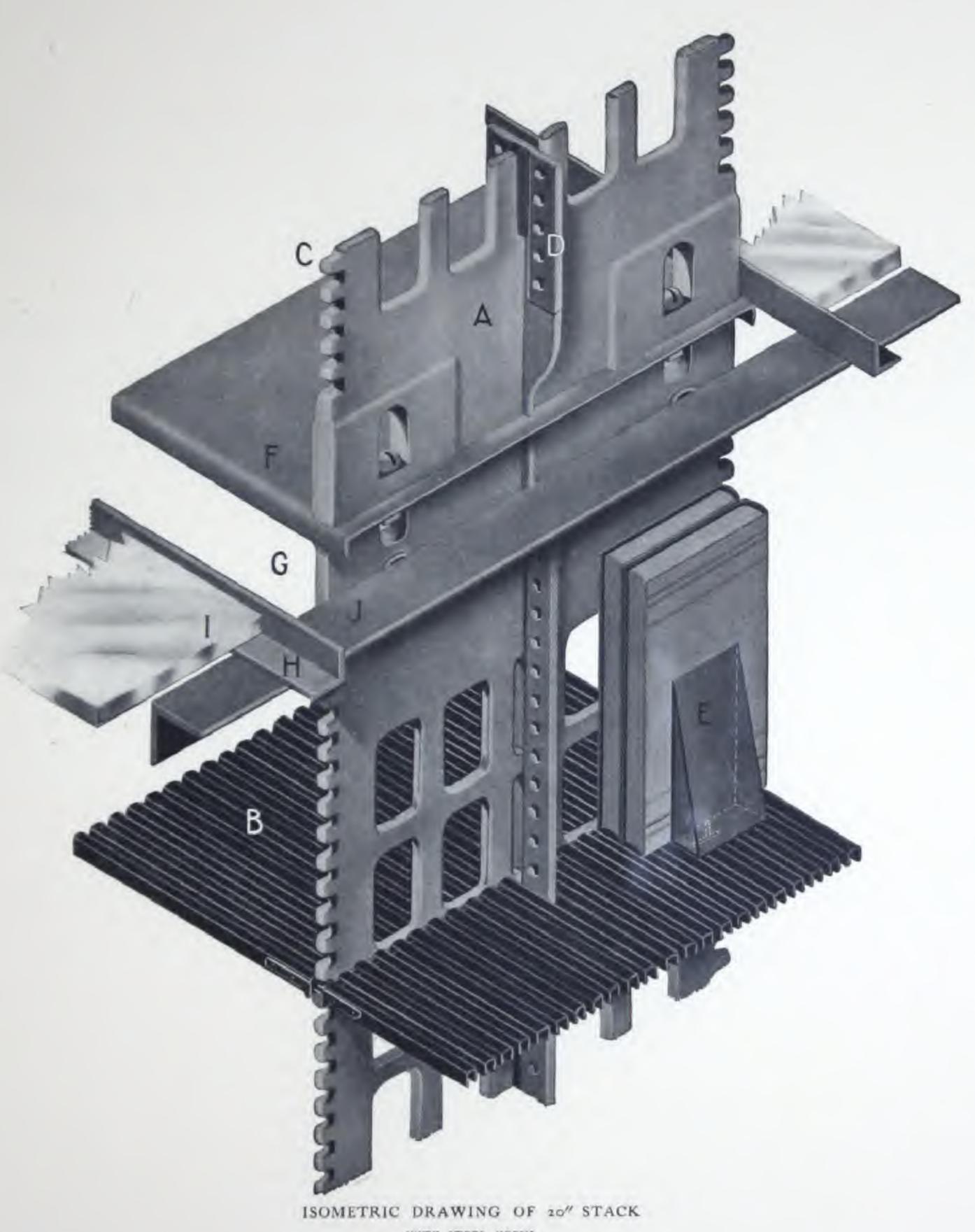
DETAIL SHOWING CONSTRUCTION AND SPECIAL FEATURES

(Key to figures 15 and 16)

- (A) Open work shelf support, permitting free circulation of air and moderate light throughout the stack. It is only 1/16-inch thick, giving a maximum space for books; of solid construction with no enclosed spaces for storing dust or harboring vermin.
- (B) Skeleton cold rolled steel adjustable shelf, also permitting free circulation of air throughout the stack; of minimum weight and maximum strength for supporting its load without deflection.

These shelves always lie level, they never get in wind or rattle on their bearings.

- (C) Tooth for supporting fronts of shelves—the shelves of adjoining compartments can rest on the same tooth, permitting a thin support and doing away with lost space.
- (D) Interlocking device or horn, securing the shelf in its place and preventing its dislodgment when in position.
 - (E) Book support, a rigid adjustable brace for books on partially filled shelves.
- (F) Diaphragm forming bottom shelf and a continuous brace at deck floors throughout the stack, also a fire, dust and water stop.
- (G) Deck slit generally 4 to 5 inches wide for circulation of air from deck to deck and for communication between decks.
- (H) Curb angle for receiving floor of marble or glass and for preventing the injury of books on bottom shelves by floor mop, book truck or the feet of attendants.
 - (I) Deck floor of marble or glass or any other suitable material.
 - (J) Deck floor girder.

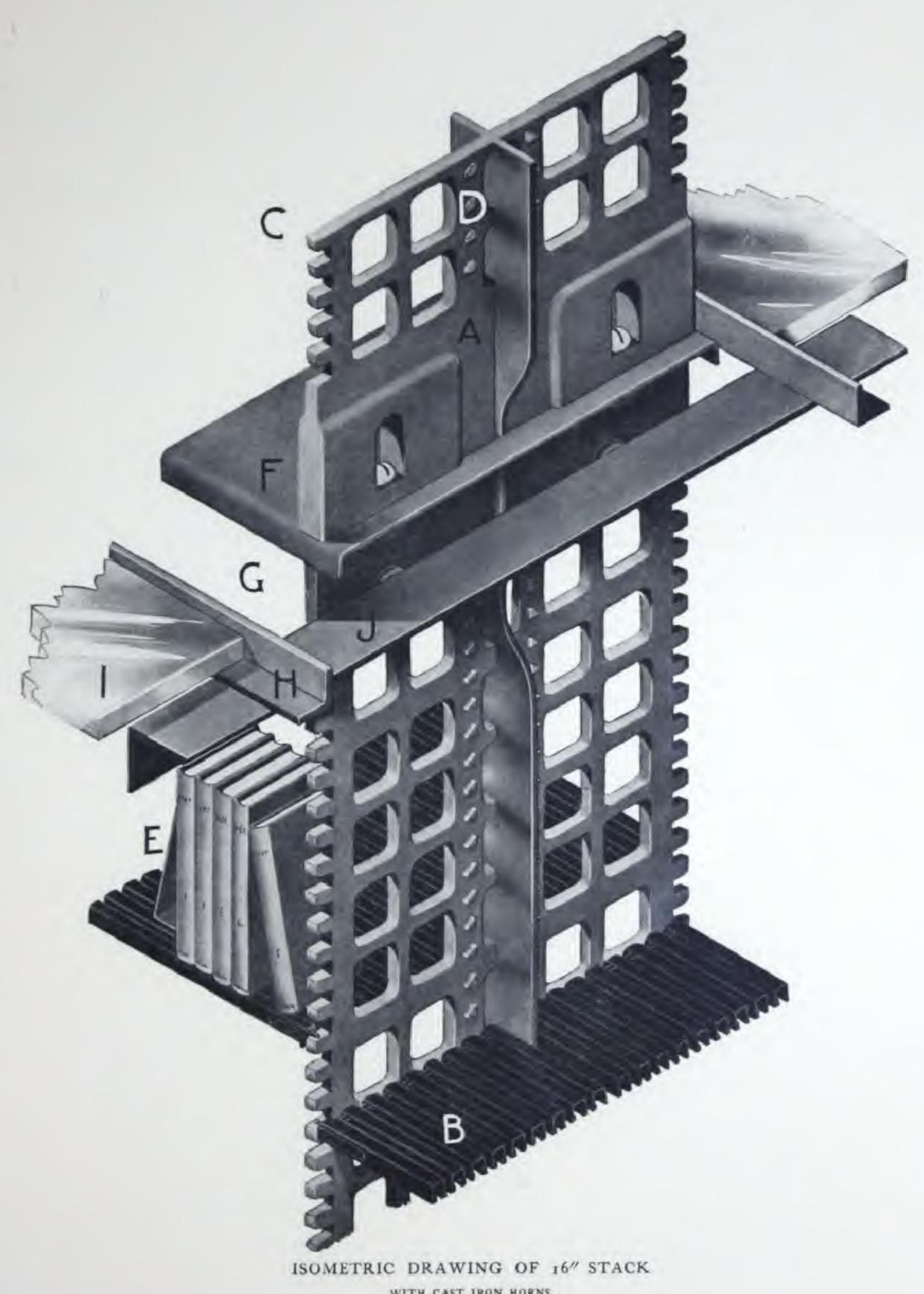


ISOMETRIC DRAWING OF 20" STACK
WITH STEEL HORNS
(Figure 15)

DETAIL SHOWING CONSTRUCTION AND SPECIAL FEATURES

(Figure 16)

FOR key see preceding page. While the steel horns are shown for the twenty-inch stack and cast iron horns for the sixty in the sixty in the steel horns are shown for the twenty-inch stack and cast iron horns for the sixteen-inch stack, either construction can be adapted to each width of stack; each performs its functions, viz., supporting the shelf, interlocking it and preventing its dislodgment by a blow or pull. The horns are all rounded and are out of the way of books and there is no liability of injury to books from either one or the other.



WITH CAST IRON HORNS (Figure 16)

NEW YORK PUBLIC LIBRARY

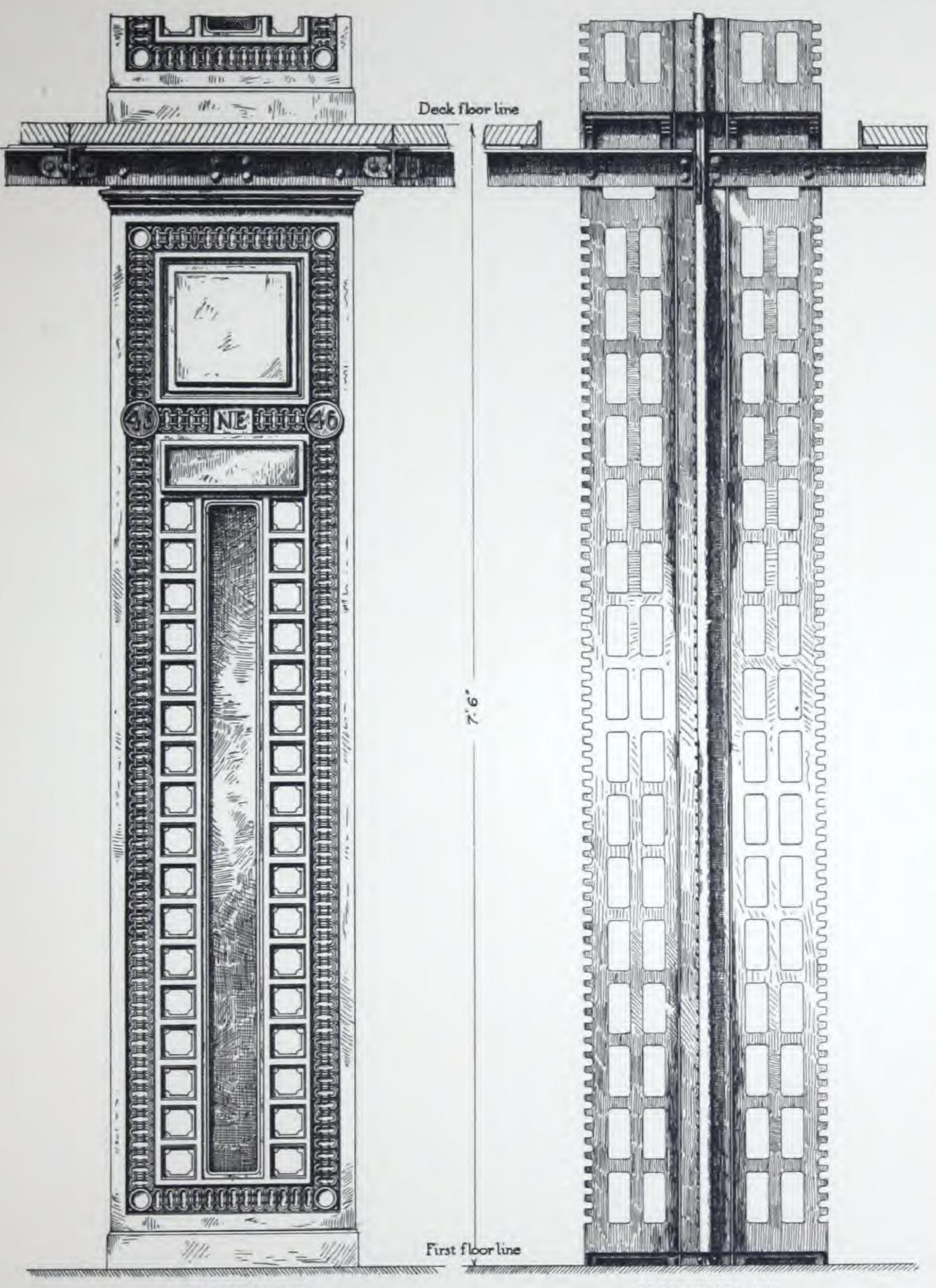
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RANGE FRONT, INTERMEDIATE SUPPORT AND DECK FLOOR

(Figures 17 and 18)

IN the design of range front shown in figure 17 provision is made for numerals and orientation letters in connection with the shelf classification, and immediately below these is a metal card frame open at the ends.

Within the stack and forming a part of the shelf supports are steel columns (see figure 6); in the New York Public Library these columns extend up through seven tiers and carry the reading room floor immediately above the stack.



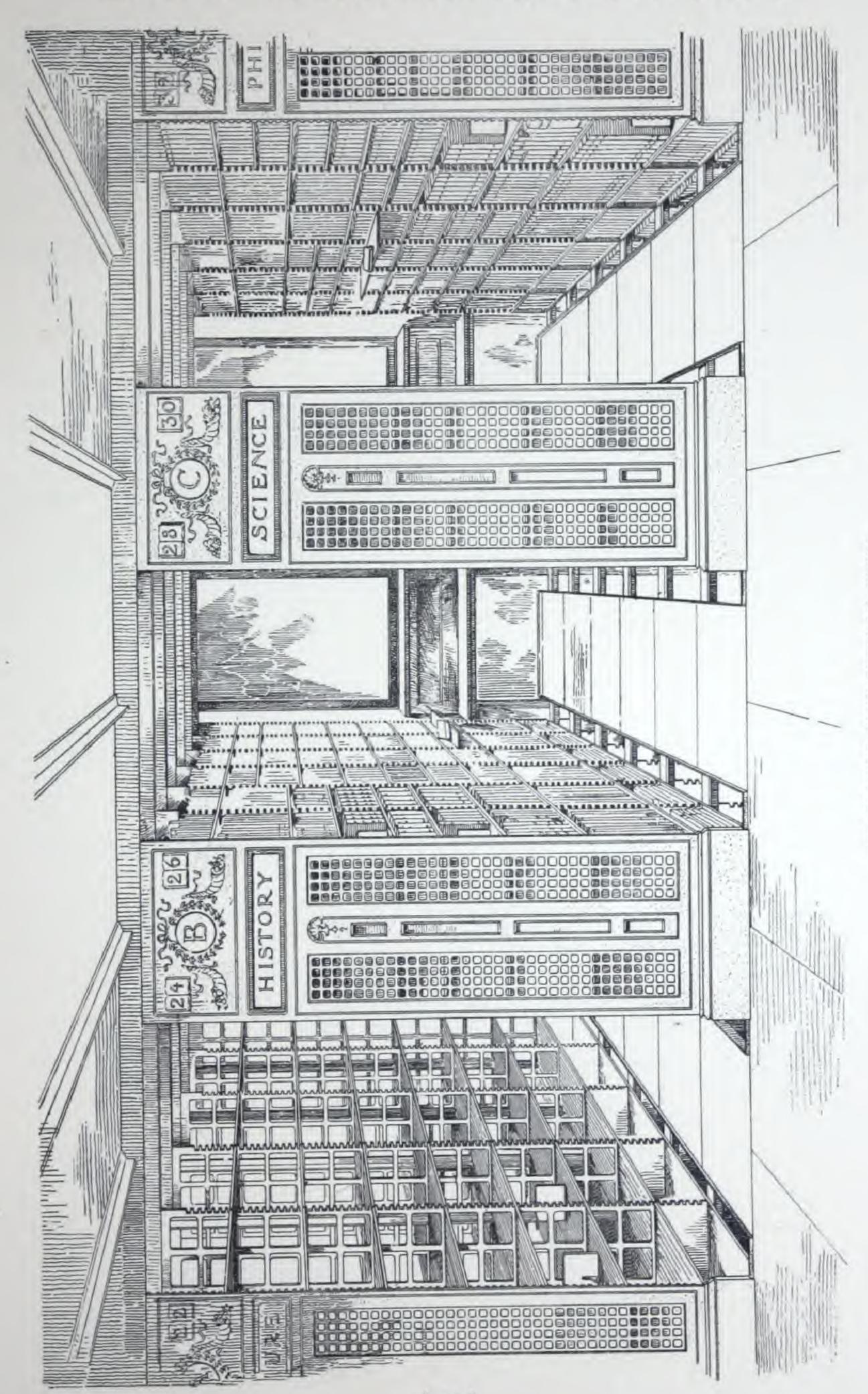
ELEVATION OF 19" RANGE FRONT FOR 9" SHELF (Figure 17) ELEVATION OF 19" SHELF SUPPORT FOR 9" SHELF (Figure 18)

[43]

LIBRARY OF CONGRESS, WASHINGTON, D. C.

(Figure 19)

THIS shows practically the Library of Congress stack. Note the shelf ledge, window seat and deck slit. Refer to plan of the land. window seat and deck slit. Refer to plan of deck, figure 8.



PERSPECTIVE VIEW BETWEEN DECKS

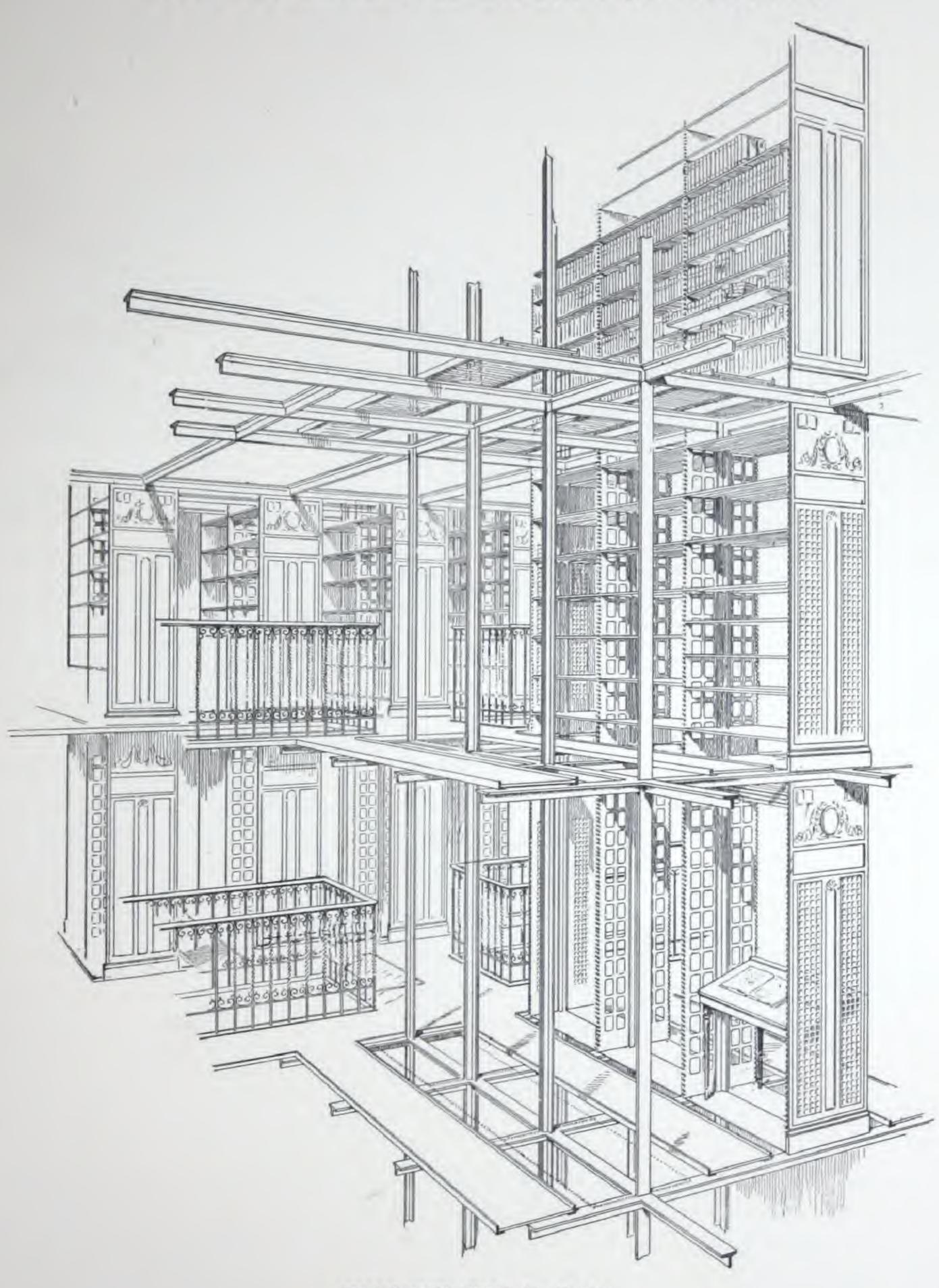
THE BOOK STACK

(Figure 20)

THE type of construction shown employs the steel column within the stack as described for figures 17 and 18. One great advantage of this construction is that it affords an opportunity of omitting the shelves and shelf supports in any tier or part of a tier, thereby resulting in economy of first cost, as the shelving can be added as required.

In either type of stack the shelves can be removed and the compartment utilized to form a passage through the stack or to receive a table resting on the bottom diaphragm plate.

IMPORTANT. One of the officers in a large library was taken ill in January 1908 with smallpox. The building was promptly closed to the public and some parts, but especially the bookstack erected by The Snead and Co. Iron Works, was disinfected with formaldehyde. The process was simple, owing to the open character of the stack, and there was not the slightest difficulty in the gas penetrating everywhere except between the leaves of closely packed and tightly closed books, this being due of course to the books themselves and not at all to the shelves which held them. The open slits of the decks and the open work of the structure comprising the range fronts, shelf supports, book supports and open bar shelves, and the entire absence of hollow enclosed spaces all made thorough disinfection possible.



PERSPECTIVE VIEW OF STACK (Figure 20)

SKELETON STEEL SHELF, BOOK SUPPORT AND LABEL HOLDER

(Figures 21 and 22)

ONE of the most important features of this system is the skeleton steel shelf which is illustrated on the opposite page. The construction is of very thin cold rolled steel, the bars being of inverted U section and the end pieces of L section, so connected as to be absolutely rigid when in place and capable of rough handling without loosening in any part. The shelf is made with a certain flexibility and resilience, preventing it from getting permanently in wind and becoming jammed between the supports, it always lies flat and cannot rattle on its bearings.

All surfaces, especially the top which receives the books, are as smooth as polished glass and the tops of the bars are broad and rounded, so that books slide or rest on them without the least injury. Every part is free from sharp edges or points. After the shelf is made it is covered with a baked enamel that protects it from rust or corrosion in contact with the books.

All shelves should be of the standard length of 3 feet and are 8 or 10 inches wide; they are thus adjustable and interchangeable throughout the stack. A standard 10-inch by 3-foot shelf weighs but 5½ pounds and will support a uniformly distributed load of 40 pounds per square foot without deflecting more than one-eighth of an inch. It is of uniform strength from front to back and does not derive its strength from a flange at the back and front, such as a sheet metal shelf.

The bar spaces furnish admirable attachment for the book supports and label holders and prevent accumulation of dust on the shelf; they add materially to the diffusion and penetration of light and to proper ventilation through the individual ranges.

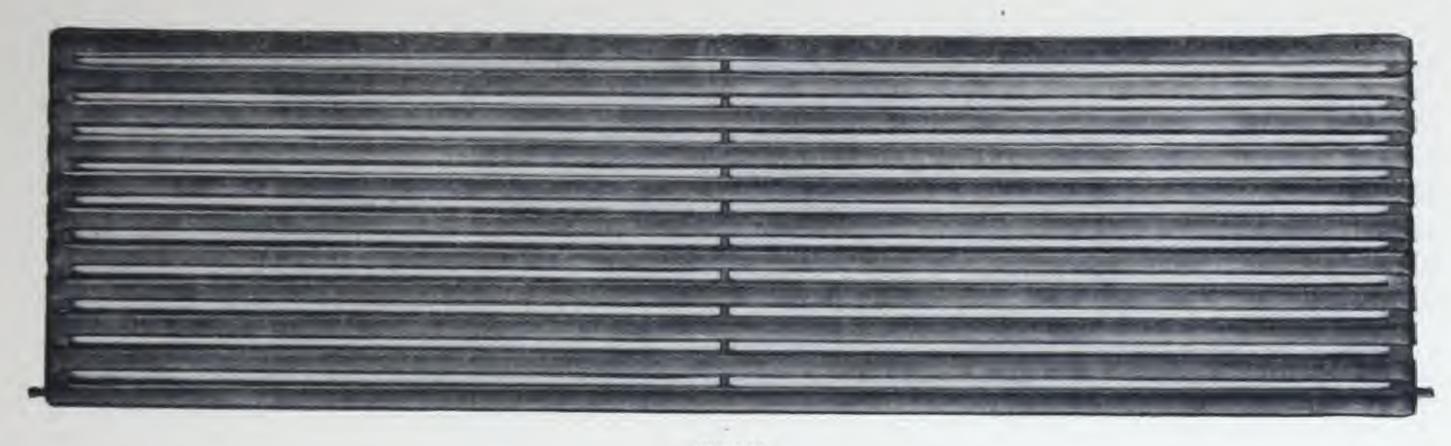
Each shelf is complete in itself and there are no catches, pins or other movable supports for which one has to search or feel, and no screw driver or spirit level to be carried about in moving or adjusting the shelf.

TEST OF SKELETON STEEL SHELF, 10" x 3'-0"

Center Load	Deflection
62 lbs.	1/16"
105 "	1/8"
150 "	3/16"
207 "	5/16"
264 "	3/8"
325 "	7/16"
506 "	1/9"

When this load was removed the shelf resumed its original shape. The same shelf finally collapsed under a center load of 712 lbs.

Forty pounds per superficial foot equals 100 lbs. distributed load or 50 lbs. center load for this shelf.



PLAN (Figure 21)



PERSPECTIVE VIEW

WITH SHELF CUT DUT TO SHOW ATTACHMENT OF BOOK SUPPORT AND LABEL HOLDER

(Figure 22)

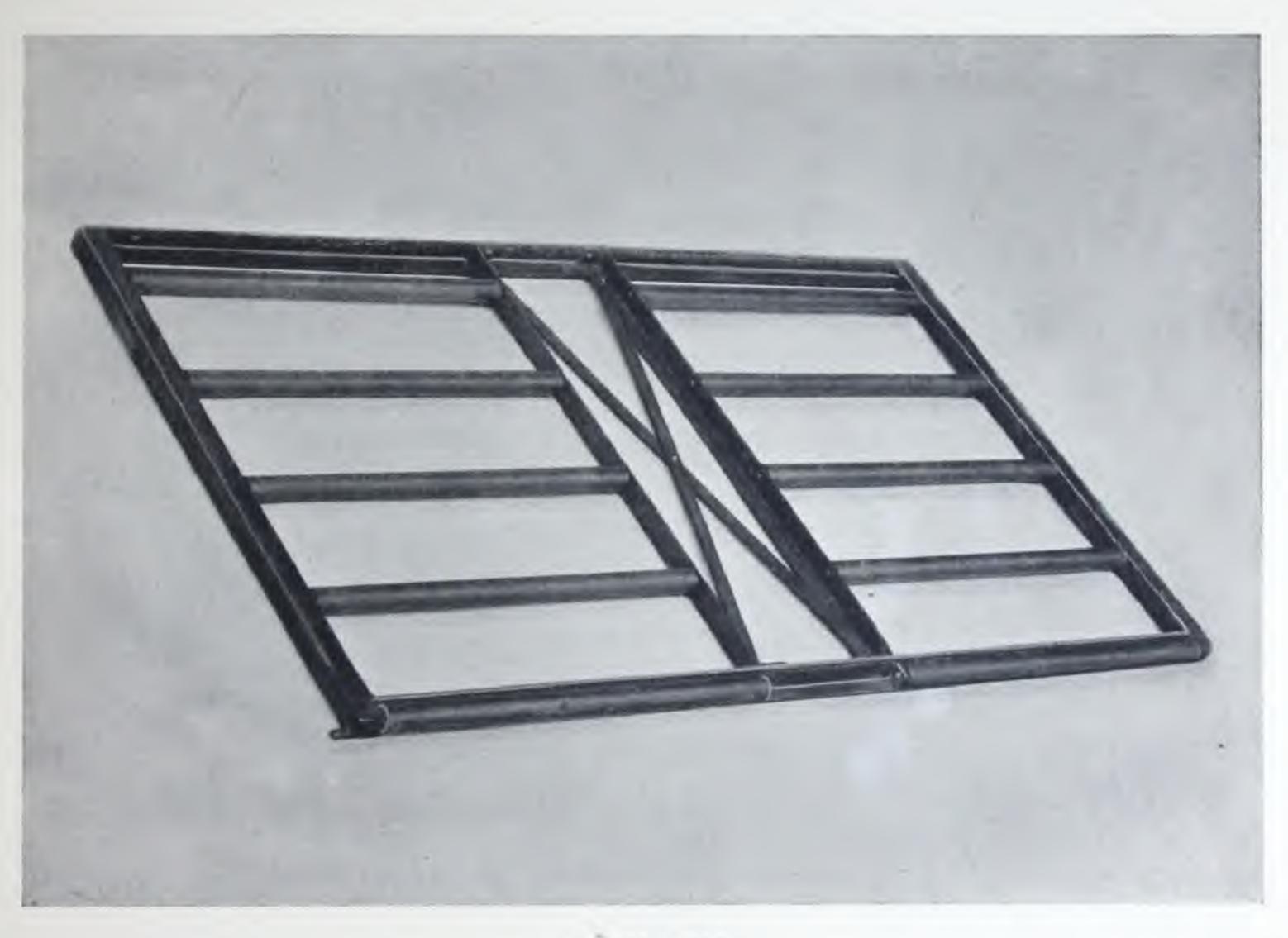
THE SKELETON STEEL SHELF

ROLLER SHELF

(Figure 23)

FOR large volumes laid flat and where sliding shelves are not desired this roller shelf is the best and strongest made, the said large state of the sa shelf is the best and strongest made; the methods of supporting and adjusting it are the same as for the standard skeleton shelf.

The shelf frame consists of steel angles and bars securely riveted together, the rollers are provided with fixed steel pins at ends that turn freely on their bearings.



ROLLER SHELF (Figure 23)

DOUBLE FACED RANGE OF TWO COMPARTMENTS

(Figure 24)

THIS illustrates a standard double faced range for 10-inch by 3-foot shelves with two compartments, the range being about 7½ feet high.

The cast iron shelf supports are perforated, consistent with strength, to permit of the free circulation of light and air throughout the stack; they are about 7/16 of an inch in thickness, which considered in comparison with sheet metal construction gives a greater book storage capacity, generally about 4 per cent. more.

The range front can be ornamented as desired and, being perforated, lends itself to the ready adjustment on the outside, by hooks or brackets, of label holders, shelf lists, notices, drop desks, etc., all of which are conveniences in library work. The narrow panel at the top can be provided with a metal card frame.

All parts of the shelf supports are rounded and there are no sharp edges to injure bindings. The whole construction is open. There are no hollow enclosed inaccessible places where dust can accumulate and where rust can form or roaches and vermin be harbored.

At the bottom of each compartment is a strong sheet steel diaphragm forming a shelf; where a stack is several tiers high this diaphragm serves as a continuation of the flooring to walk through the range whenever an open passage through any bay may be desired and is obtained by simply removing the shelves (see figure 20). The diaphragm also serves as a fire and dust stop.

There is no finish for iron or steel which is permanent. It is therefore best to use for the fixed parts of a stack some coating such as paint or air drying enamel which can be renewed in place. Baked enamel is very hard and tough at first and presents a good appearance, but it will gradually become abraded and worn through the general wear and tear of ordinary usage. After a few years the color deadens and the enamel loses its life so that it chips and cracks, especially where applied on large surfaces. It can then be renewed only by rubbing off what remains of the coating, dipping the parts again and baking them in an oven at a high temperature. This process is impossible for the fixed parts and can be employed for the shelves alone.

The standard cast iron shelf supports have been tested by the Ordnance Department of the United States Government at the Watertown Arsenal, Mass., and found amply strong to carry their loads.

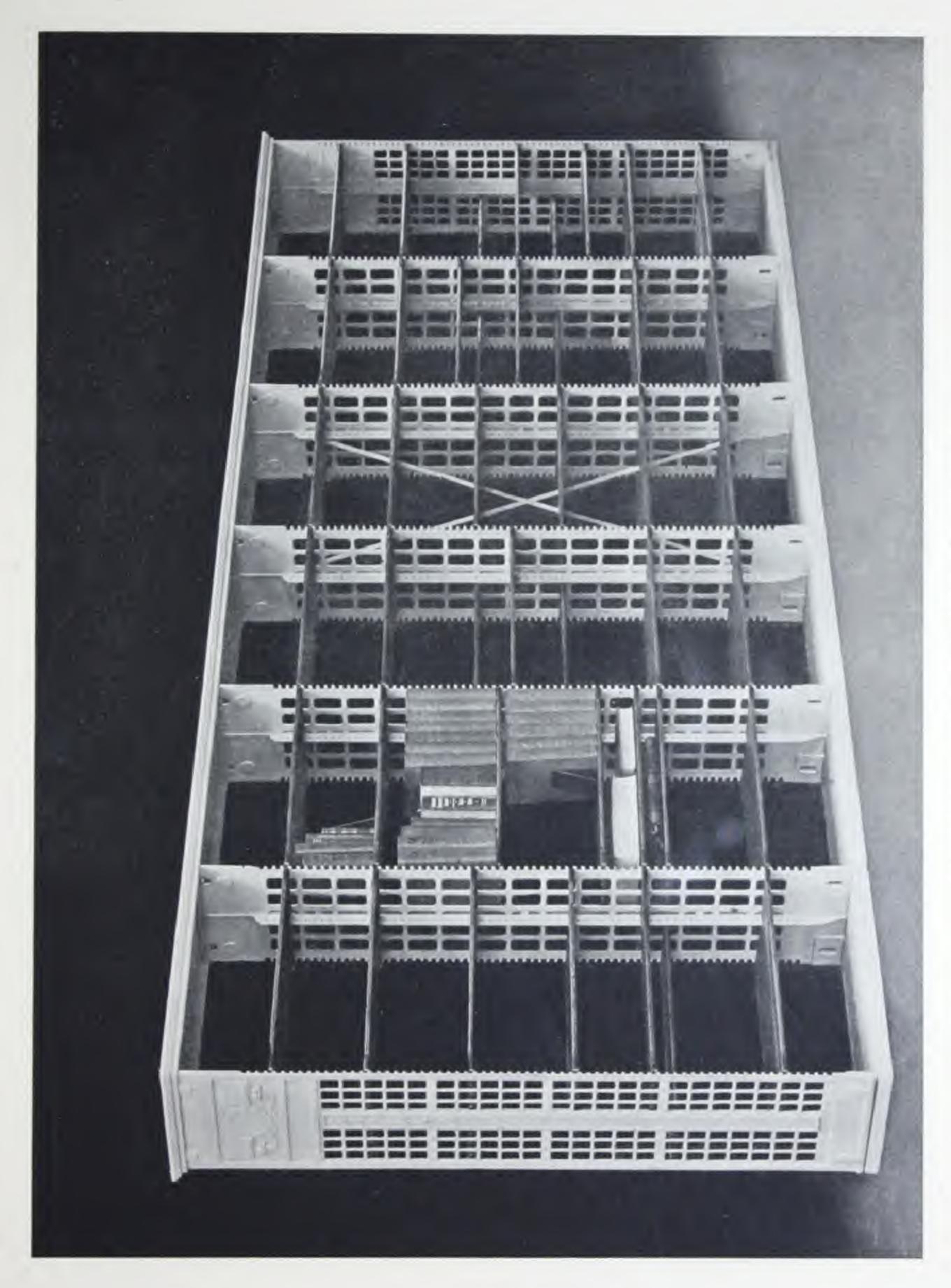


RANGE FOR 10" SHELVES (Figure 24)

DOUBLE FACED RANGE OF SIX COMPARTMENTS

(Figure 25)

THE general description given for figure 24 applies as well here, the construction of the ranges being identical and only the land order. of the ranges being identical and only the design of the range front changing. It should be noted that the diagonal braces shown in figure 25 are not required where the range is attached to the wall or is connected at the top to the floor framing of an upper tier.



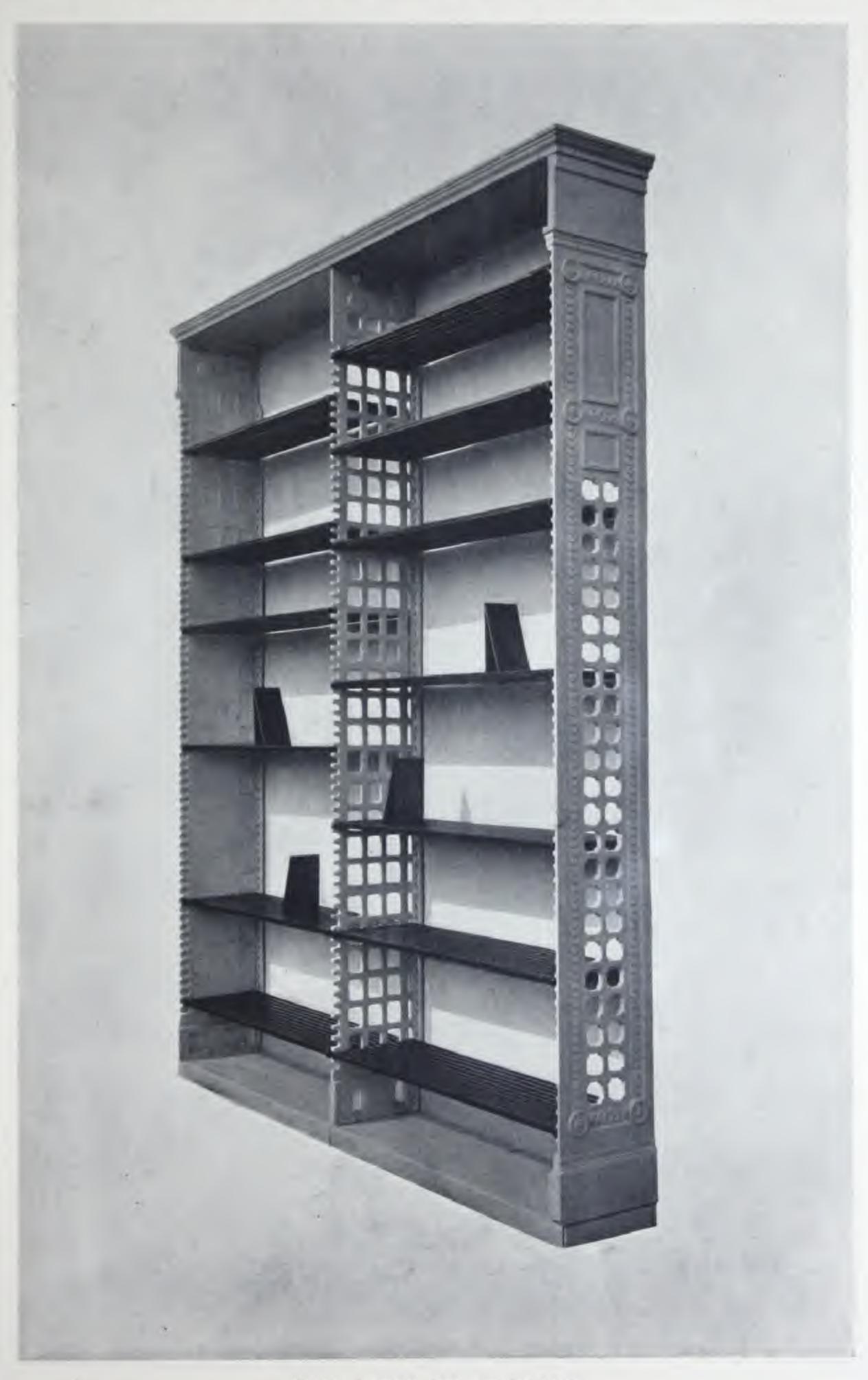
ALTERNATIVE DESIGN OF RANGE FOR 10" SHELVES (Figure 25)

WALL RANGE

(Figure 26)

FOR single faced ranges placed against the walls the ends are designed to harmonize with the double faced ranges, as will be seen by comparing figures 26 with figure 24.

These cases are suitable for offices and private residences as well as for libraries.



WALL RANGE FOR 10" SHELVES (Figure 26)

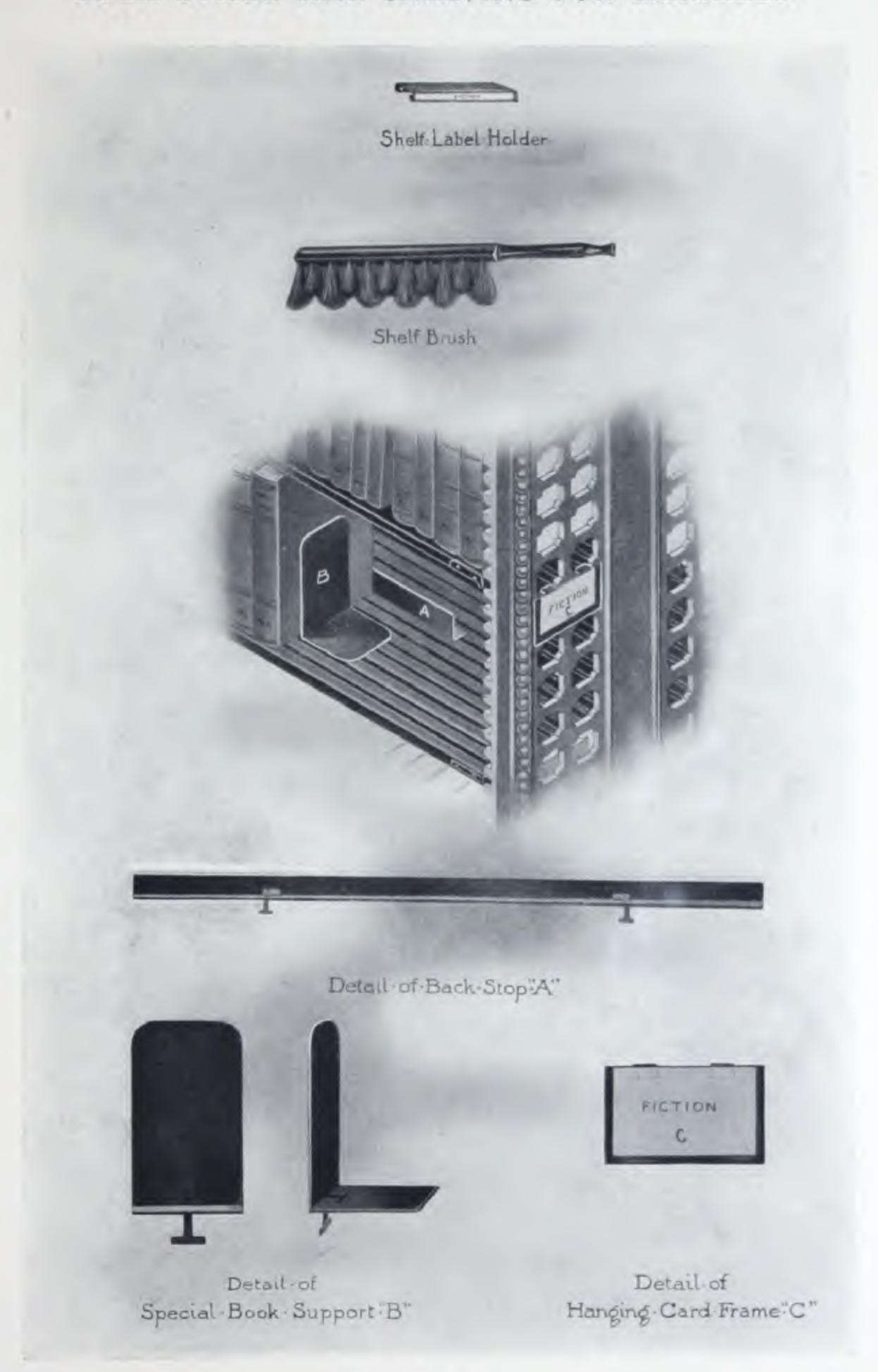
ACCESSORIES

THE skeleton shelves and the openness of the construction of the Green-Snead Book Stack render feasible the use of many convenient accessories to meet the needs of library administration.

The perforations in the range fronts can be used to attach hanging card frames as shown on the opposite page. The shape, size and design of these may be varied to suit special requirements.

It is frequently found necessary to have some means of preventing books from being pushed back too far on a shelf. The steel back stop shown serves this purpose as it can be secured by the keys through any of the slits in the shelf. This stop causes the fronts of books of regular depth to form a straight line and present a good appearance; it prevents small books from being lost to view behind larger ones. It is especially useful in an open shelf room as the public is liable to be careless in replacing books.

The special angle book support shown is a variation from that illustrated on page 29, it is equally convenient, more easily cleaned and cheaper.



CAST IRON BRACKET STACK

(Figures 27, 28 and 29)

THE bracket stack has been introduced to meet the wants of libraries where it is desired to have the shelves in each compartment of varying widths from bottom to top, or where the funds available for the purchase of stacks are limited.

In designing this type of bracket stack an effort was made to carry out as far as possible the same principles which were followed for our standard stack. The result has been to make a bracket stack far superior to any other. The shelf supports are of solid cast iron, wasting no space and avoiding any hollow inaccessible places where dust can collect or rust form. Each shelf consists of a cold rolled steel plate, flanged at the front and back, on which side brackets are bolted. A unique design has been adopted for the brackets so that when secured in place they are perfectly rigid and will always fit the supports. The front edge of each bracket is flanged to prevent it from entering between the leaves of a book and causing injury. This obviates a serious fault common to nearly every bracket stack.

Figure 29 shows the shelves with perforated cast iron brackets. Shelves may be of wood.

STEEL BRACKET STACK

(Figures 30 and 31)

A more economical bracket stack than the cast iron type is the construction shown in Figures 30 and 31. The stack and shelves throughout are made exclusively of steel.

There is practically no loss of book storage space between adjoining compartments and the shelves are more easily adjusted and not so easily dislodged as in the bracket stacks of other makes. Each shelf bracket is supported on the upright at five points simultaneously. The shelves are similar in construction to those described above for the cast iron bracket stack.

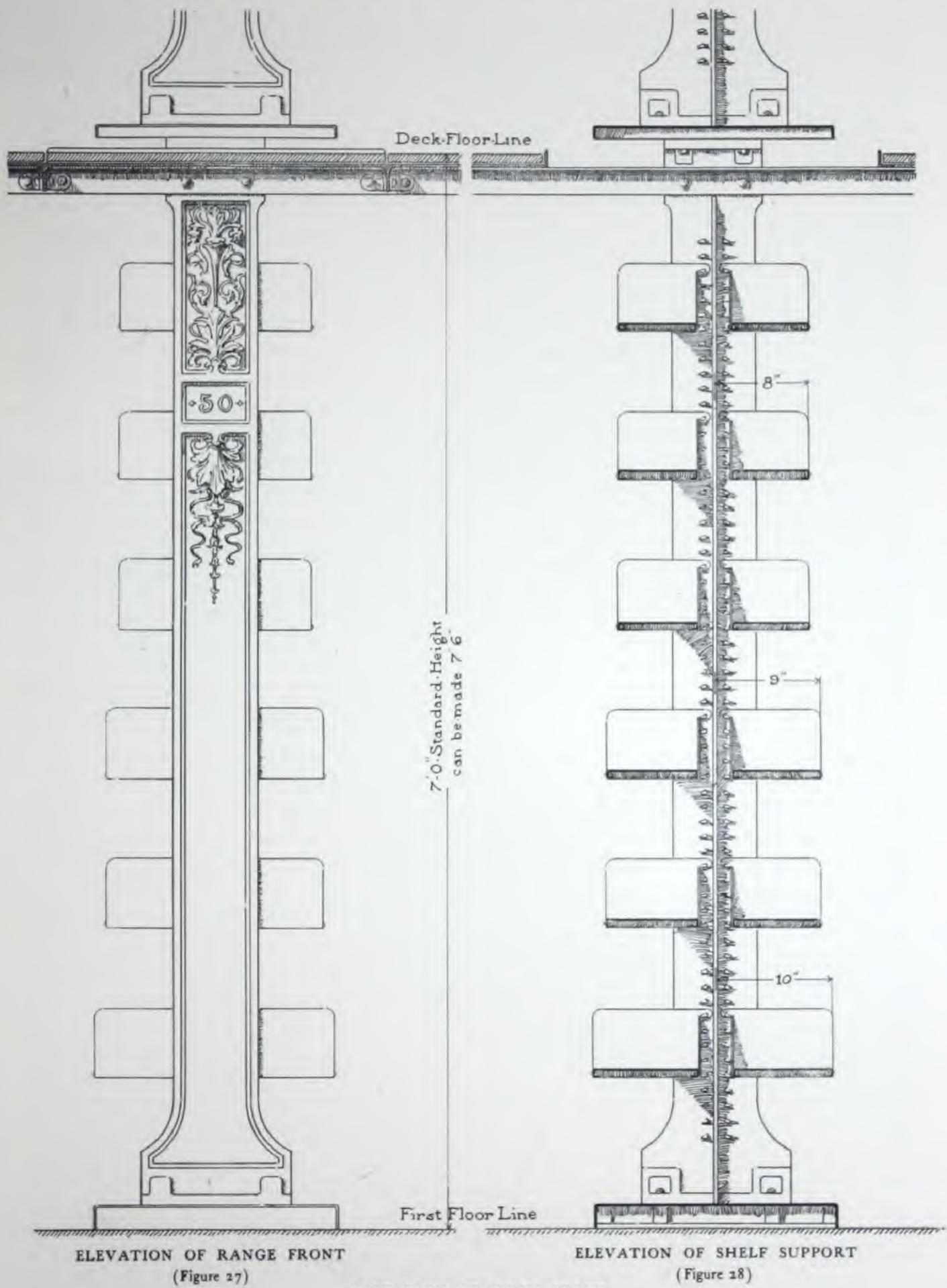
ORNAMENTAL ENDS

(Figures 32 and 33)

Where a bracket stack is installed for reasons of economy it is frequently desired that it present the appearance of a standard stack from an end view. This is attained by the use of a "closed end" which hides the books and shelves. Figure 33 shows a "closed end" of cast iron. The design and ornament of this may be varied to suit the taste of the architect or librarian.

Plainer ends can be furnished in cold rolled sheet steel.

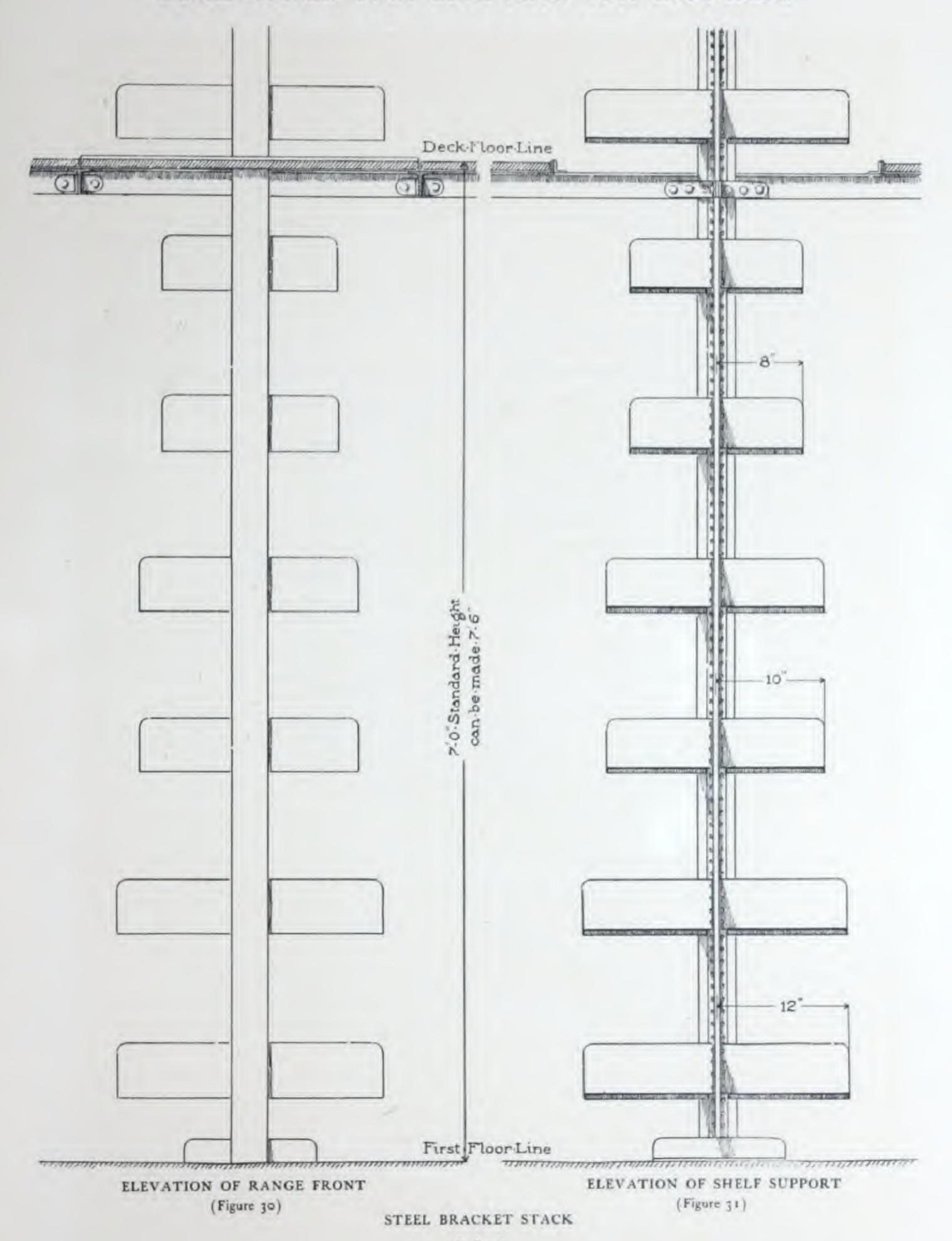
Pilaster ends as shown in Figure 32 may be used for either the cast iron or steel bracket stacks.

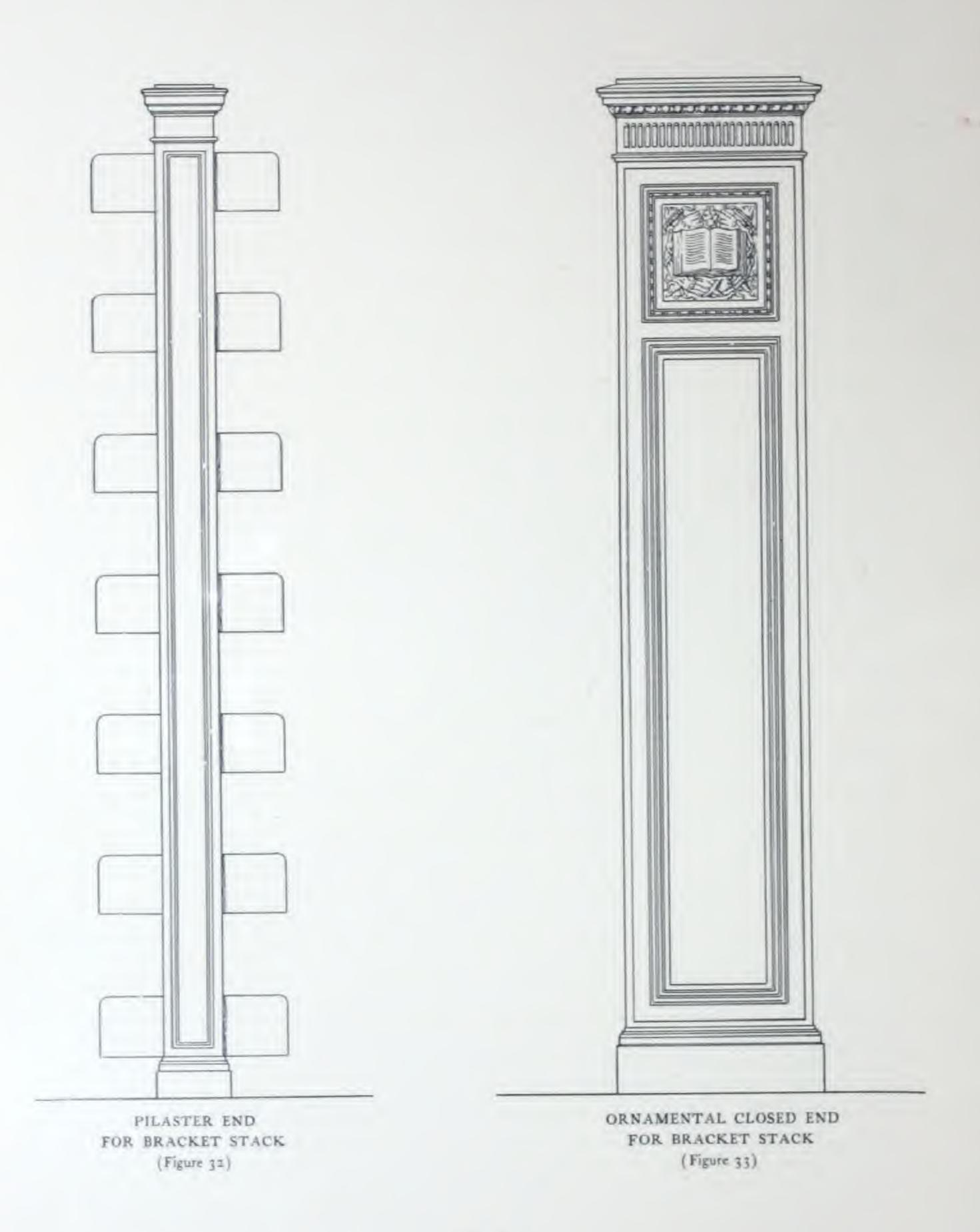


CAST IRON BRACKET STACK



CAST IRON BRACKET STACK (Figure 29)





CAPACITY OF SHELVING

IN ascertaining the quantity of shelving required to accommodate a certain number of books the character of the library must be duly considered.

For a law library but five volumes per running foot of shelf can be taken, for a scientific library seven volumes per foot, for a reference library eight volumes per foot and for a circulating public library ten volumes per foot.

In stacks 7 or 7½ -ft. high, seven shelves (six adjustable and one fixed) are usually counted in each single-faced 3-ft. shelf compartment.

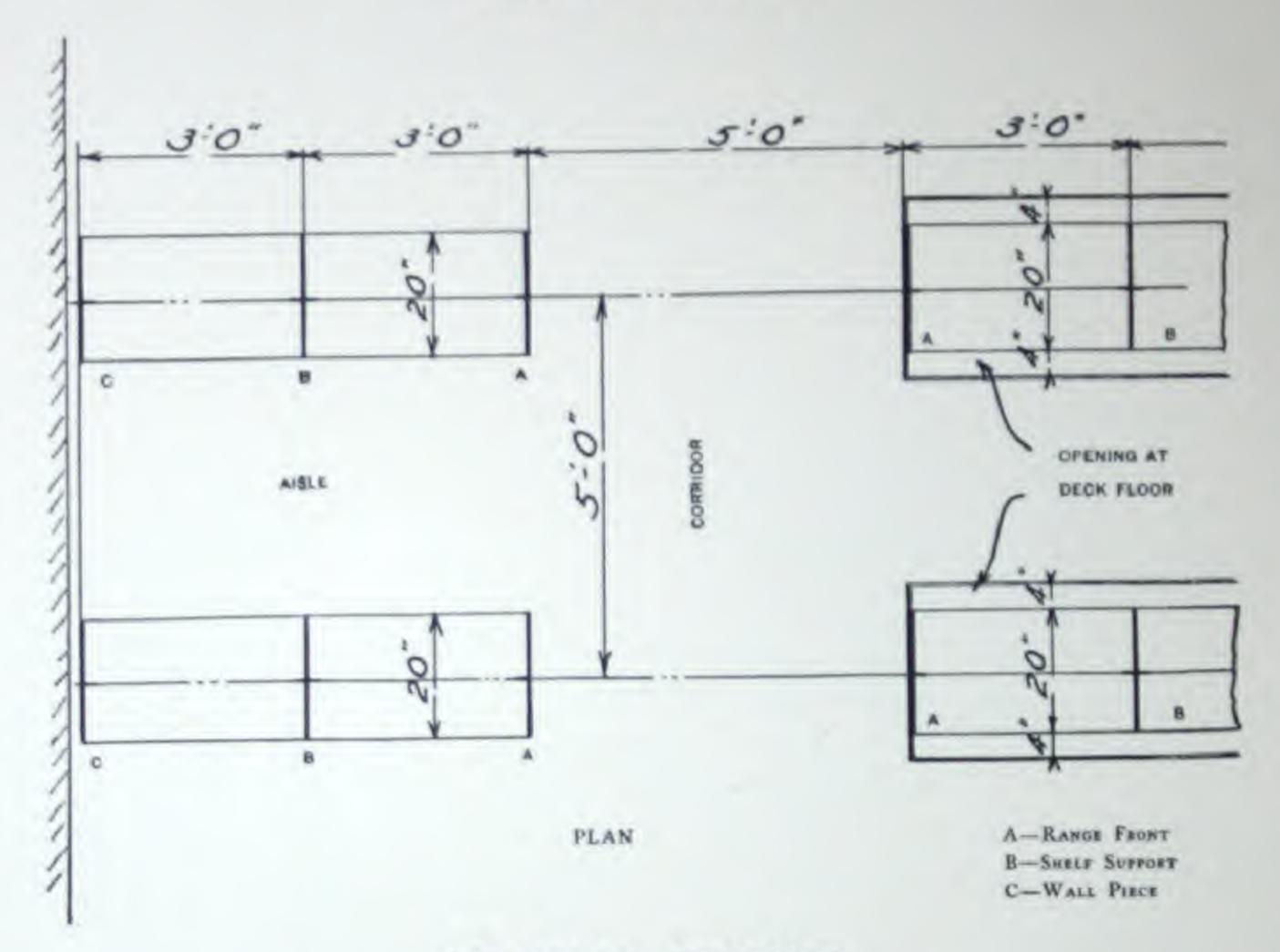
From the above data the following table is formulated:

	Vols. per running ft. of shelf.	Vols. per single-faced 3-ft, compartment.	Vols. per double-faced 3-ft. compartment.
Law Library,	5	105	210
Scientific Library, .	7	147	294
Reference Library, .	8	168	336
Circulating Library,	10	210	420

The question of depth of shelf to be adopted must also be determined from the books to be shelved. In law and circulating public libraries an 8-in. shelf is widely used; for a reference library several widths should be provided and for scientific collections the shelves are best 11 or 12 inches deep.

It is of importance when comparing prices of different types of stacks to also compare their relative capacities. The amount of space available for storing books is not determined by the total length of each range multiplied by the number of shelves in each compartment, but by the net length of each shelf, found by measuring the clear distance between supports, multiplied by the total number of shelves.

TABLE OF WEIGHTS OF BOOK STACKS AND DECK FLOORS



AVERAGED WEIGHTS

Deck Floor Framing—6 lbs. per sq. ft. Gross Area. 34" Glass Flooring—10 lbs. per sq. ft. Net Area. 1½" Marble Flooring—20 lbs. per sq. ft. Net Area. Stacks and Shelves—10 lbs. per cu. ft. of Stack. Books—20 lbs. per cu. ft. of Stack.

Live load taken at 40 lbs. per square foot net area for top floor and reduced ten per cent. for each floor below.

For Tables of Loads see pages 67 and 68.

TABLE OF LOADS

USING 3/4" GLASS FLOORING

TIER	LOADS IN LBS.	A	В	C
12th,	Dead,	770 660	1,190 320	595 160
11th,	Total from above, Dead, Live,	1,430 770 595	1,510 1,190 290	755 595 145
10th,	Dead,	2,795 770 535	2,990 1,190 260	1,495 595 130
9th,	Dead,	4,100 770 480	4,440 1,190 240	2,220 595 120
8th,	Dead,	5,350 770 435	5,870 1,190 210	2,935 595 105
7th,	Dead,	6,555 770 390	7,270 1,190 190	3,635 595 95
6th,	Dead,	7,715 770 350	8,650 1,190 170	4,325 595 85
5th,	Dead,	8,835 770 315	10,010 1,190 150	5,005 595 75
4th,	Dead,	9,920 770 285	11,350 1,190 140	5,675 595 70
3d,	Dead,	10,975 770 255	12,680 1,190 130	6,340 595 65
2d,	Dead,	12,000 770 230	14,000 1,190 110	7,000 595 55
1st,	Total,	13,000	15,300	7,650

TABLE OF LOADS
USING 11/2" MARBLE FLOORING

TIER	LOADS IN LBS.	A	В	С
12th,	Dead,	940 660	1,270 320	635
r 1 th,	Total from above, Dead, Live,	1,600 940 595	1,590 1,270 290	795 635 145
oth,	Dead,	3,135 940 535	3,150 1,270 260	1,575 635 130
9th,	Dead, Live,	4,610 940 480	4,680 1,270 240	2,340 635 120
8th,	Dead,	6,030 940 435	6,190 1,270 210	3,095 635 105
7th,	Dead,	7,405 940 390	7,670 1,270 190	3,835 635 95
6th,	Dead,	8,735 940 350	9,130 1,270 170	4,565 635 85
5th,	Dead,	10,025 940 315	10,570 1,270 150	5,285 635 75
4th,	Dead,	11,280 940 285	11,990 1,270 140	5,995 635 70
3d,	Dead,	12,505 940 255	13,400 1,270 130	6,700 635 65
2d,	Dead, Live,	13,700 940 230	14,800 1,270 110	7,400 635 55
1st,	Total,	14,870	16,180	8,090

ELECTRIC LIGHTING

EVERY stack room, whether provided with windows or surrounded by blank walls, is dependent at times upon artificial illumination and this should be provided only by means of incandescent electric lamps placed in the ceiling of the stack aisles and corridors, the conduits containing the wires being supported directly by the deck framing.

The distribution of light and method of control may be varied to suit the individual requirements, the lights, however should be not more than six feet apart in the stack aisles and from twelve to fourteen feet apart in the corridors.

For separate control of the lights in each stack aisle between the ranges switches may be placed on the stack ends, the vertical conduits or risers being enclosed in iron ducts, or a hanging tassel switch can be used. The latter form answers every purpose and is the more economical because of not requiring the vertical conduits or ducts. It has the further advantage of leaving all the wiring and switches easily accessible for alteration or repair. For a stack room open to readers it is best to have the lights controlled individually by means of a key or chain pull.

In the large libraries, notably the Library of Congress and the New York Public Library, each stack floor is divided into several sections and all of the wires brought to central points where switch boards are located to control the lighting of the respective sections. This greatly reduces the cost of installation and has the advantage of grouping the switches at convenient points where the library attendants pass regularly.

BOOK LIFTS

FOR a small library with a stack of two or three tiers the vertical book lift is usually of the dumb-waiter type, the car being of wood or sheet steel two shelves high and operated by a hand rope. The upper shelf should be hinged at the back and arranged to drop down when large books are to be carried.

In a high stack the same style of car may be used but the power should be electric with automatic push button control. With this arrangement the car may be sent to or brought from any landing by pushing the proper button and it stops automatically at the desired landing. The doors in the enclosure of the book lift shaft are equipped with automatic switches which prevent the starting of the car until all doors are closed. The electric lifts generally operate with a speed of from 100 to 150 feet per minute with a capacity of from 100 to 300 pounds.

When it is necessary to convey the books horizontally from one part of the building to another mechanical carriers are employed and these can be designed to serve as both carrier and lift operating as an endless chain.

THE LIBRARY OF CONGRESS WASHINGTON, D. C.

SMITHMEYER & PELZ AND EDWARD P. CASEY, ARCHITECTS

LIBRARY OF CONGRESS, WASHINGTON, D. C.

SMITHMEYER & PELZ AND EDWARD P. CASEY, ARCHITECTS

AN Act of Congress, passed April 15, 1886, authorized the construction of a library building substantially according to the plan submitted by John L. Smithmeyer in the Italian renaissance style of architecture, with such modifications as might be found necessary or advantageous.

The original designs for the building were furnished by John L. Smithmeyer and Paul J. Pelz and the architectural details were worked out by Paul J. Pelz and Edward P. Casey. The construction of the building was under the direction of a commission until October, 1888, when, before the foundations were laid, the commission was abolished by Congress and the work placed under the control of General Thomas L. Casey, the Chief of Engineers of the Army, with directions to submit a plan for approval. He placed Bernard R. Green in charge as superintendent and engineer, who, upon the death of General Casey, March 25, 1896, succeeded to full control until the building was completed February 28, 1897, at the cost of \$6,344,585.34, exclusive of the land.

The building is approximately 470 feet by 340 feet with four inner courts 150 feet by 75 feet to 100 feet, and consists of cellar, basement, first, second and attic stories, with an octagonal dome rising 120 feet above the main roof. It has 32,600 square feet, or nearly eight acres of floor space.

The central feature is the main reading room, 100 feet in diameter, extending from the first floor 125 feet to the inner dome and lighted through eight large arched windows in the clerestory. It has 210 desks and 36 alcove tables and can accommodate 250 readers at one time. In the alcoves there are two stories of metal shelving holding over 120,000 volumes. The issue desk is in the center of the reading room; it is connected with the three stacks by pneumatic tubes and with the two main stacks with mechanical book carriers.

Each stack has nine "decks" or floors, seven feet from floor to floor. The dimensions and capacities of the stacks are as follows:

The first story also contains the senators' reading room and the representatives' reading room, besides rooms set apart for periodicals, maps and charts, bibliography, cataloguing, order division, general administration and the librarian.

The divisions of manuscripts, documents, prints, exhibits of books, manuscripts and prints, and the Smithsonian division are located in the second story. The Smithsonian room is 131 feet long by 35 feet wide and has a book stack of three decks with capacity of about 150,000 volumes, provided with an electric elevator.

A three tier stack has also been installed in the north curtain, second floor, for manuscripts and documents, the total capacity being 250,000 volumes. The westerly stacks in the first tier are enclosed with plate glass for greater security.

The building already contains some 56 miles of shelving for books not inclusive of that for prints, music and maps and charts.

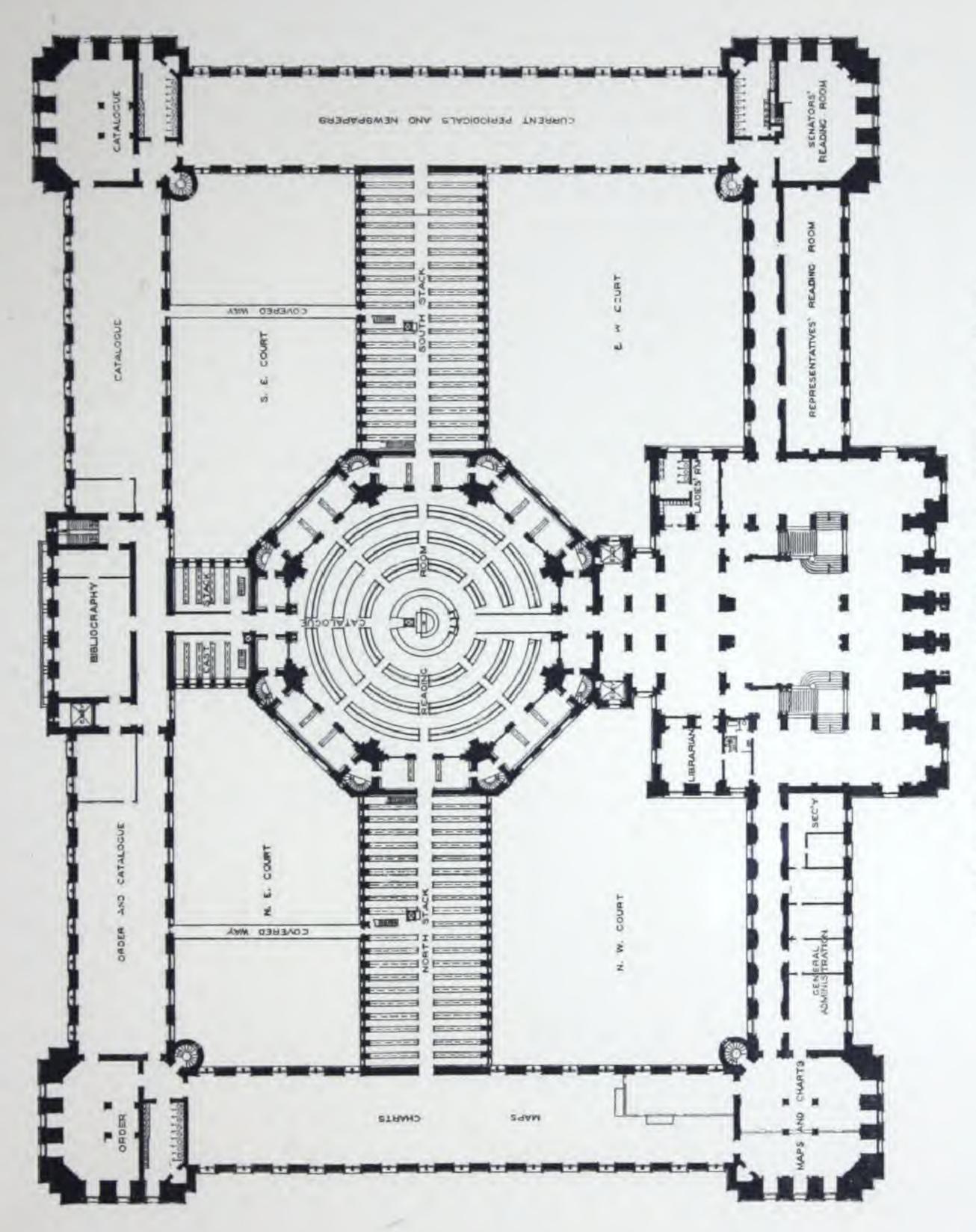
In the attic are rooms for photography, repair of prints and manuscripts, storage, a public restaurant, and a room containing a book stack of 80,000 volumes capacity for the Slavic section.

Outside of the three main stacks the basement story contains the reading room for the blind, the departments of music and copyrights, a branch of the Government Printing Office, the offices of the superintendent, chief clerk and the watch, and the mail room which handles all material arriving at or dispatched from the library building, including all mail matter and books delivered for outside use.

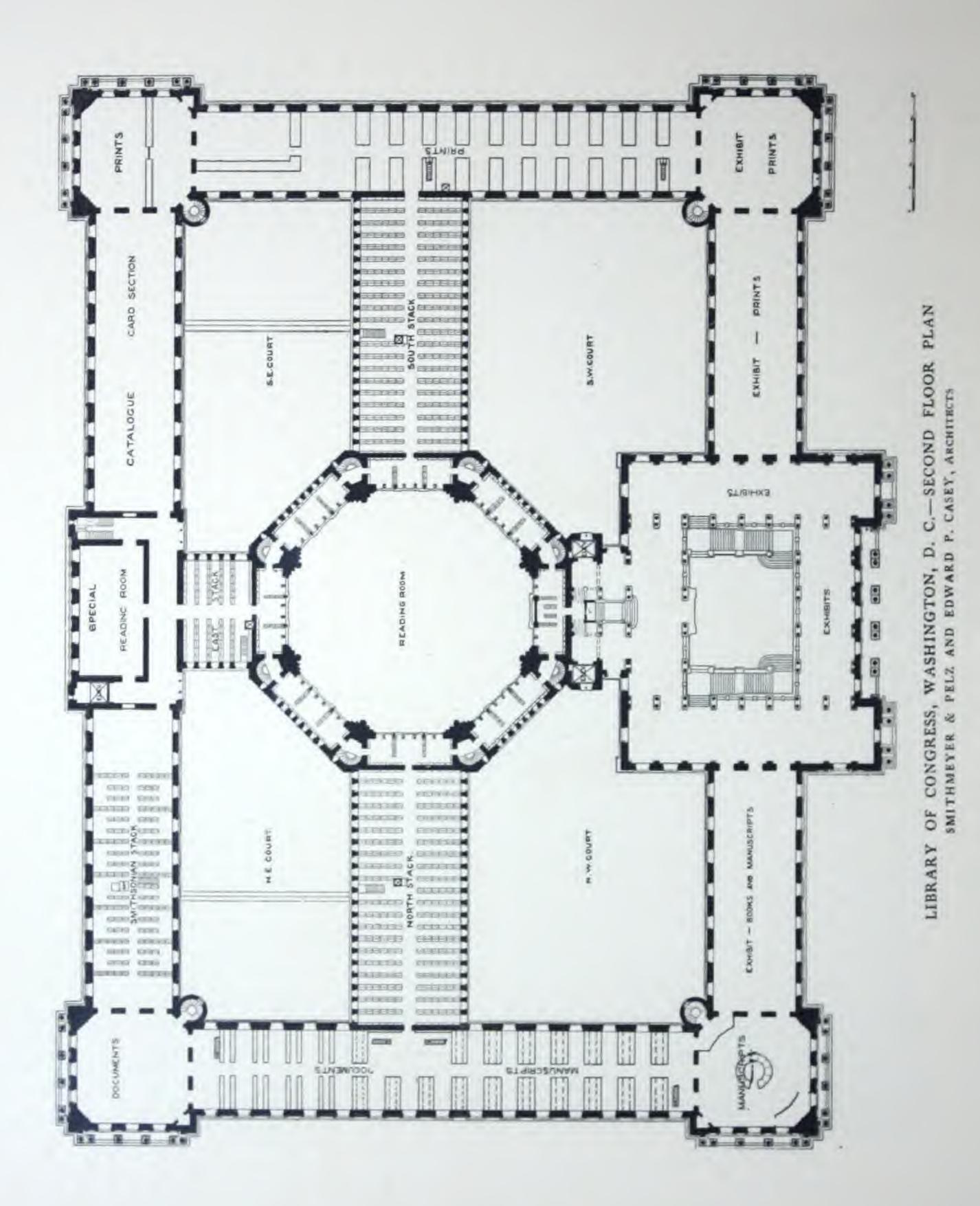
The cellar space is devoted to the machinery room, heating apparatus, workshops and storage. The boilers and coal vaults are located under the parking, near but quite outside the building at the east front.

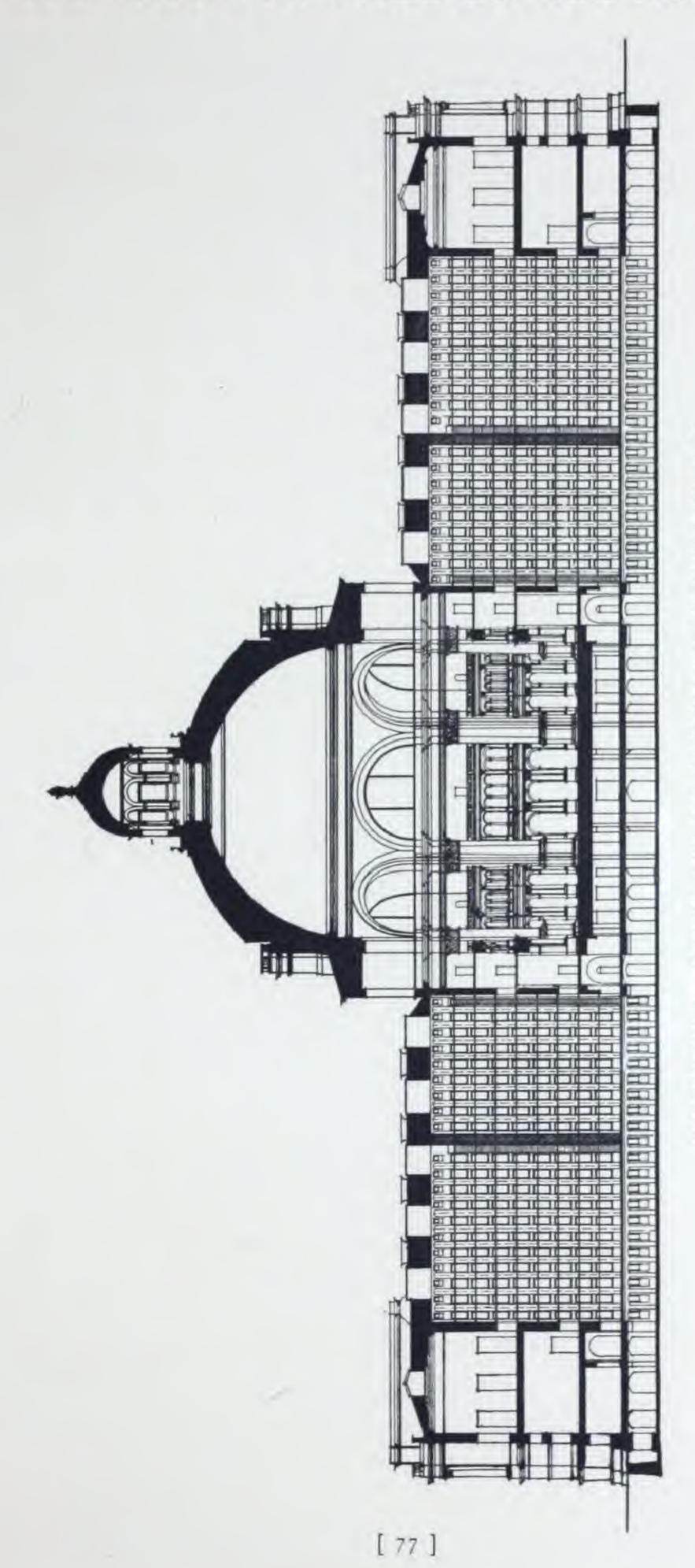


LIBRARY OF CONGRESS, WASHINGTON, D. C. SMITHMEYER & PELZ AND EDWARD P. CASEY, ARCHOTECTS



LIBRARY OF CONGRESS, WASHINGTON, D. C.-FIRST FLOOR PLAN SMITHMEYER & PELZ AND EDWARD P. CASEY, ARCHITECTS





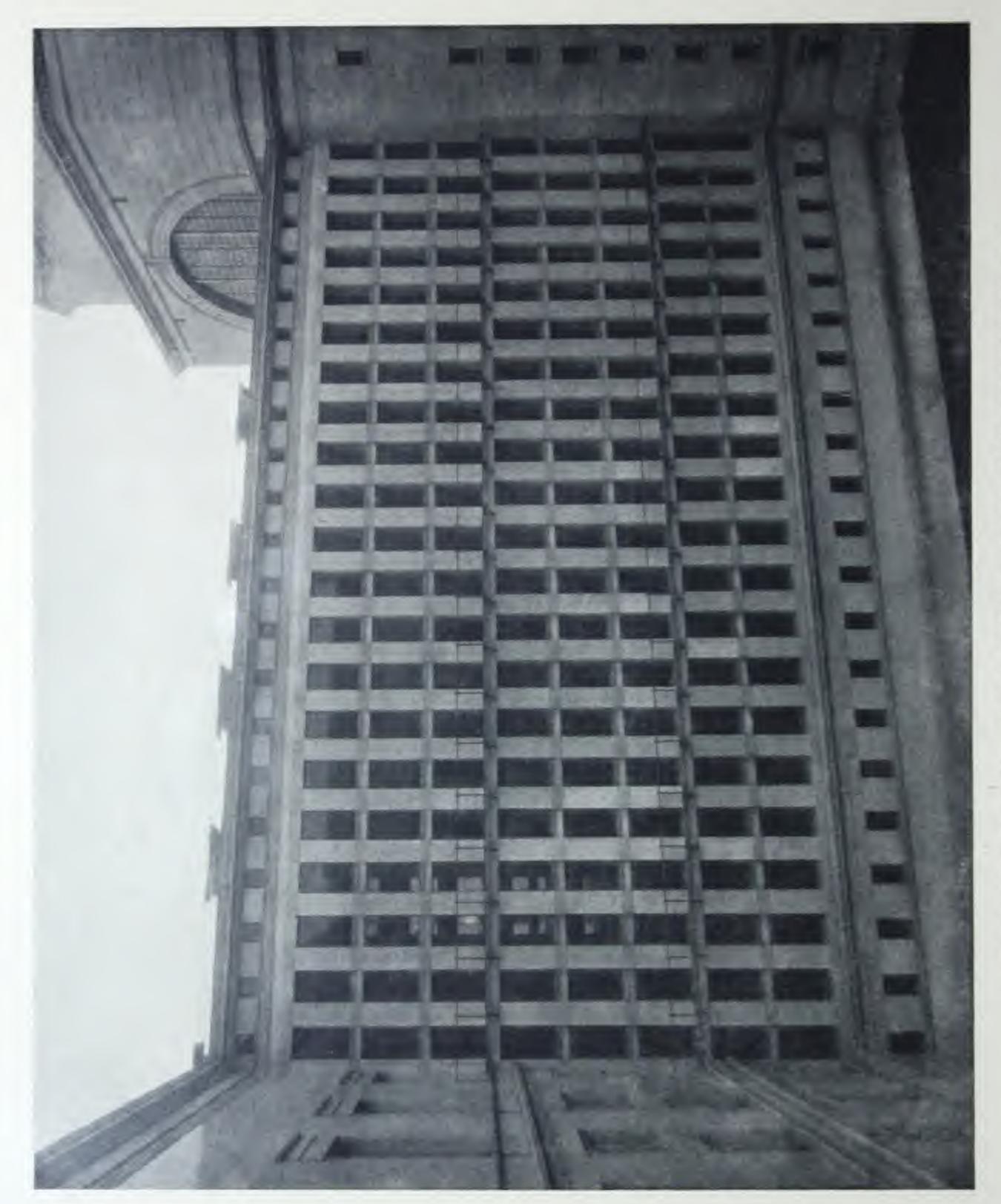
LONGITUDINAL SECTION, LIBRARY OF CONGRESS, WASHINGTON, D. C. SMITHMEYER & PELZ AND EDWARD P. CASEY, ARCHITECTS



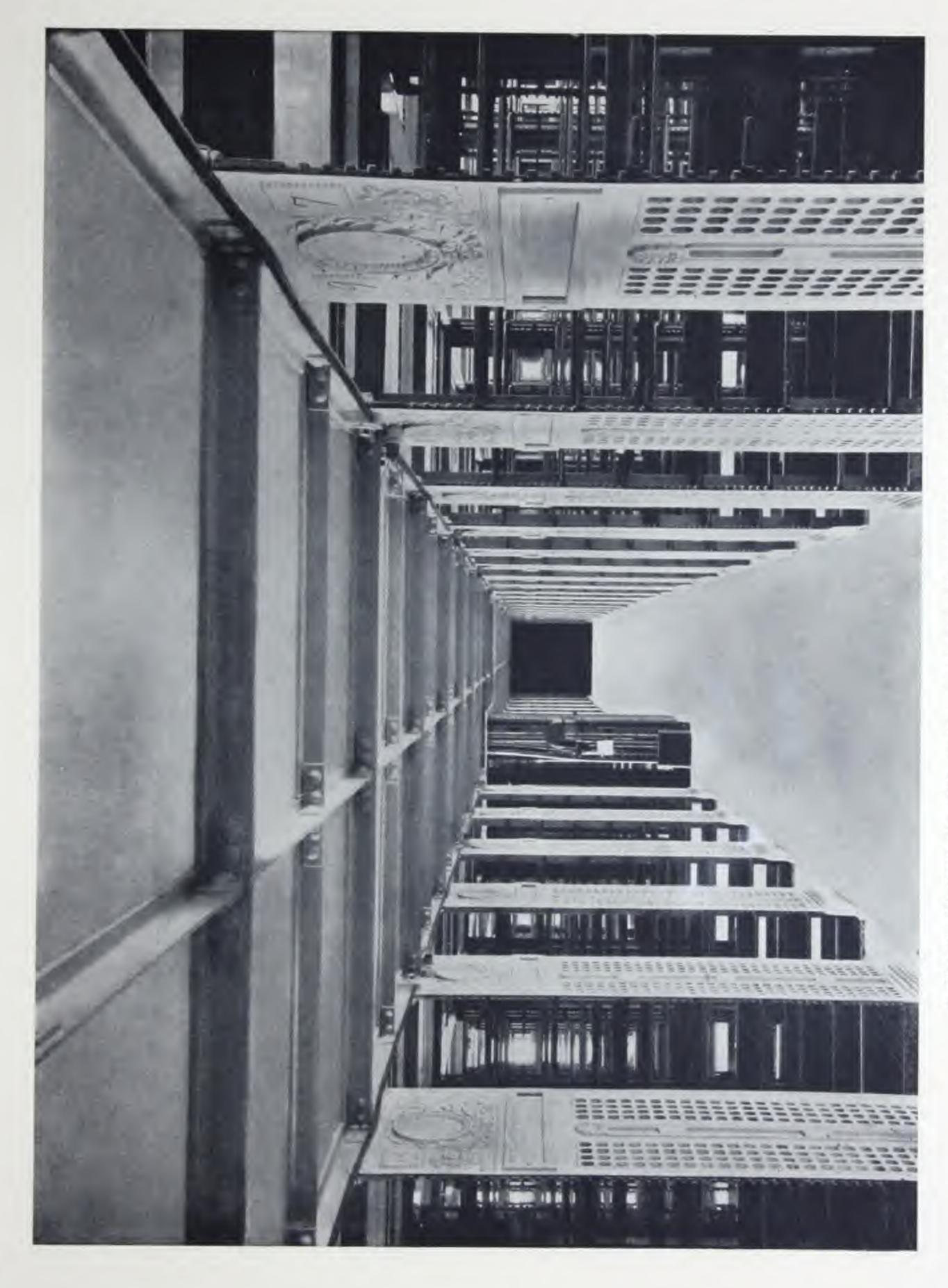
THE MAIN READING ROOM, LIBRARY OF CONGRESS, WASHINGTON, D. C. SMITHMEYER & PELZ AND EDWARD P. CASEY, ARCHITECTS



VIEW AT STAIRWAY IN THE NORTH STACK, LIBRARY OF CONGRESS, WASHINGTON, D. C. SMITHMEYER & PELZ AND EDWARD P. CASEY, ARCHITECES



EXTERIOR OF THE NORTH STACK, LIBRARY OF CONGRESS, WASHINGTON, D. C. SMITHMRYER & PELZ AND EDWARD P. CASEY, ARCHITECTS



A FLOOR IN THE NORTH STACK, LIBRARY OF CONGRESS, WASHINGTON, D. C. SMITHMEYER & PELZ AND EDWARD P. CASEY, ARCHITECTS

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THE NEW YORK PUBLIC LIBRARY

NEW YORK CITY

CARRÈRE & HASTINGS, ARCHITECTS

NEW YORK PUBLIC LIBRARY

CARRERE & HASTINGS, ARCHITECTS

THE New York Public Library was founded on the 23d of May, 1895, by the consolidation of the Astor Library, Lenox Library and the Tilden Trust, a board of twenty-one trustees being elected from the boards of these three corporations. Provision was made for maintaining a free public library, with such branches as might be considered advisable.

The site chosen for the main building was in Bryant Park on Fifth Avenue between 40th and 42d streets, at the easterly end then occupied by the old reservoir. The Legislature passed a law in May, 1896, authorizing the removal of the reservoir and the lease of the land to the Library, and a year later an act was passed providing for the construction by the city of a library building on this site.

On November 11, 1897, the architects were selected in competition for the new building and in December the plans were approved by the city. The removal of the reservoir was begun in June, 1899, and the entire building was under roof at the end of November, 1906. Since that time the construction has progressed as rapidly as possible with a structure of this monumental character and it is expected that the building will be completed by 1911 at a total cost of over \$7,000,000.00.

The general dimensions of the building are 390 feet front by 270 feet deep and the heights of the floors are as follows:—cellar, 13 feet; basement, 15 feet; first story, 22 feet 6 inches; second story, 16 feet; third story, ceiling height 11 to 23 feet; main reading room, 50 feet. The area covered by the library exclusive of the open south court, is 115,000 square feet. The north court is enclosed under a glass roof. The total floor space, exclusive of the cellar, is nearly nine acres.

The basement is the main floor of the building so far as the business of the library is concerned. It contains the lending delivery room entered directly by the entrance to the north. Along the front to the south and extending down the side to the driveway entering the south court are the book binding department and printing office. Across the corridor from the front is a lunch room for library employees.

The principal entrance to the first floor gives direct access to the rotunda. At the right as one enters is the technical science reading room. Across the corridor are the reading room for the blind, the elevator hall and lobby. Toward the rear on this side are two small reading rooms, and back of them is a large room devoted to patents.

At the left of the rotunda in the first story is the periodical room occupying the entire corner. Opposite this are several small rooms, among them a reception room.

The south side of this floor is given up to the administration of the library and there are the offices of the superintendent, the working room of the clerks, the office of the chief of circulation, and a receiving and checking room.

The second story, as can be seen on the plan, contains rooms for applied science, economics and documents, the Hebrew room and the Russian room, the director's and trustee's rooms, and space for a series of small studies, the order, cataloguing and accessions rooms.

On the third floor, in a large room over the rotunda in the center of the front, will be the Stuart collection of rare works. Other rooms on this floor are for music, photography, art and architecture, prints, manuscripts, maps, picture galleries and reading rooms.

The main bookstack occupies the larger part of the rear of the building and extends upward through the basement, first and second stories. It is 297 feet long, 78 feet wide, and is made up of seven tiers each 7 feet 6 inches high with marble floors. Each tier contains 978 double-faced compartments for 9-inch shelves and 146 compartments for 12-inch shelves. Along the walls are compartments 24 inches, 26 inches and 30 inches deep, fitted with sliding shelves. In all the main stack contains 96,000 adjustable and 16,000 fixed shelves, which, placed end to end, would extend a distance of 63 miles; the capacity of this big stack is 3,200,000 volumes. In 53 other rooms in the basement, first, second and third stories metal bookstacks are provided with a combined capacity of 900,000 volumes, making the building's total capacity over 4,000,000 books.

On the third floor immediately above the main stack and carried by it is the main reading room, 76 feet by 295 feet, capable of seating about 700 readers. The roof is high, rising above the main portion of the building, and the room is lighted by a series of windows on both sides of its entire length. In the center is the delivery department, the electric elevators and the pneumatic tubes connecting with the stack room below.

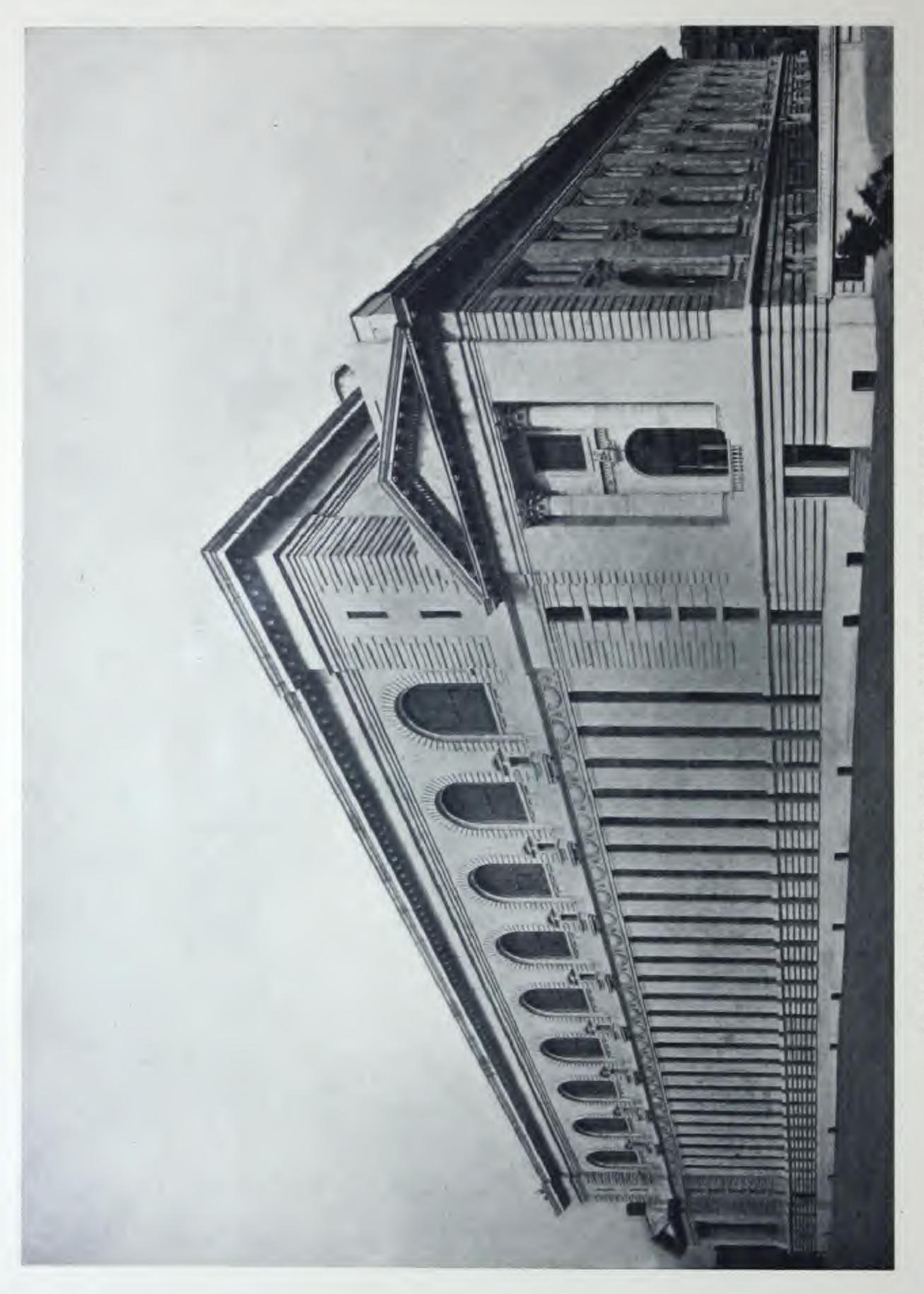
One of the features of this library is a vacuum sweeper system and this will be utilized in cleaning the books and stack room shelves, doing away with the old time microbe-scattering brushes and dust cloths.



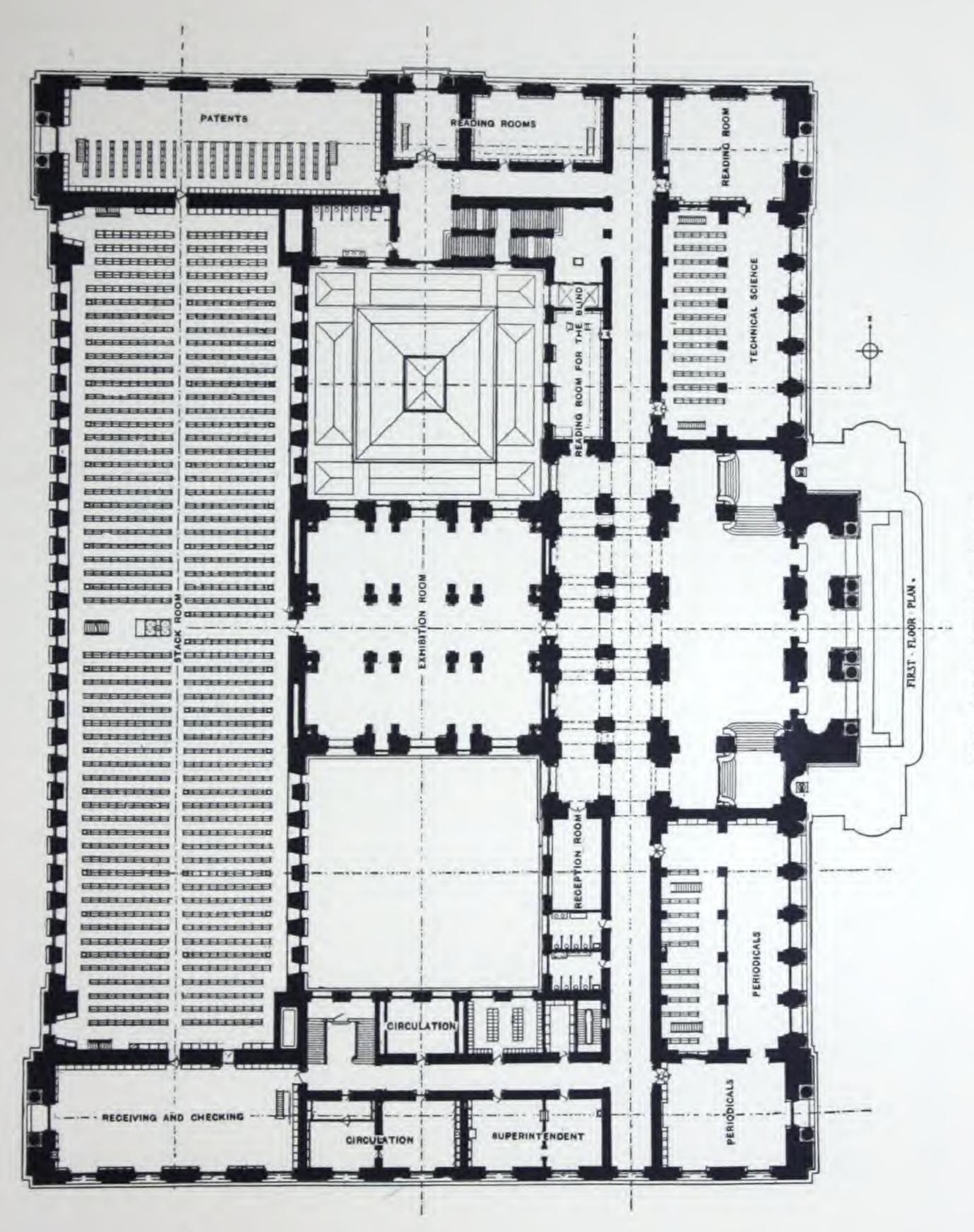
PLASTER MODEL OF NEW YORK PUBLIC LIBRARY CARRERE & HASTINGS, ARCHITECTS



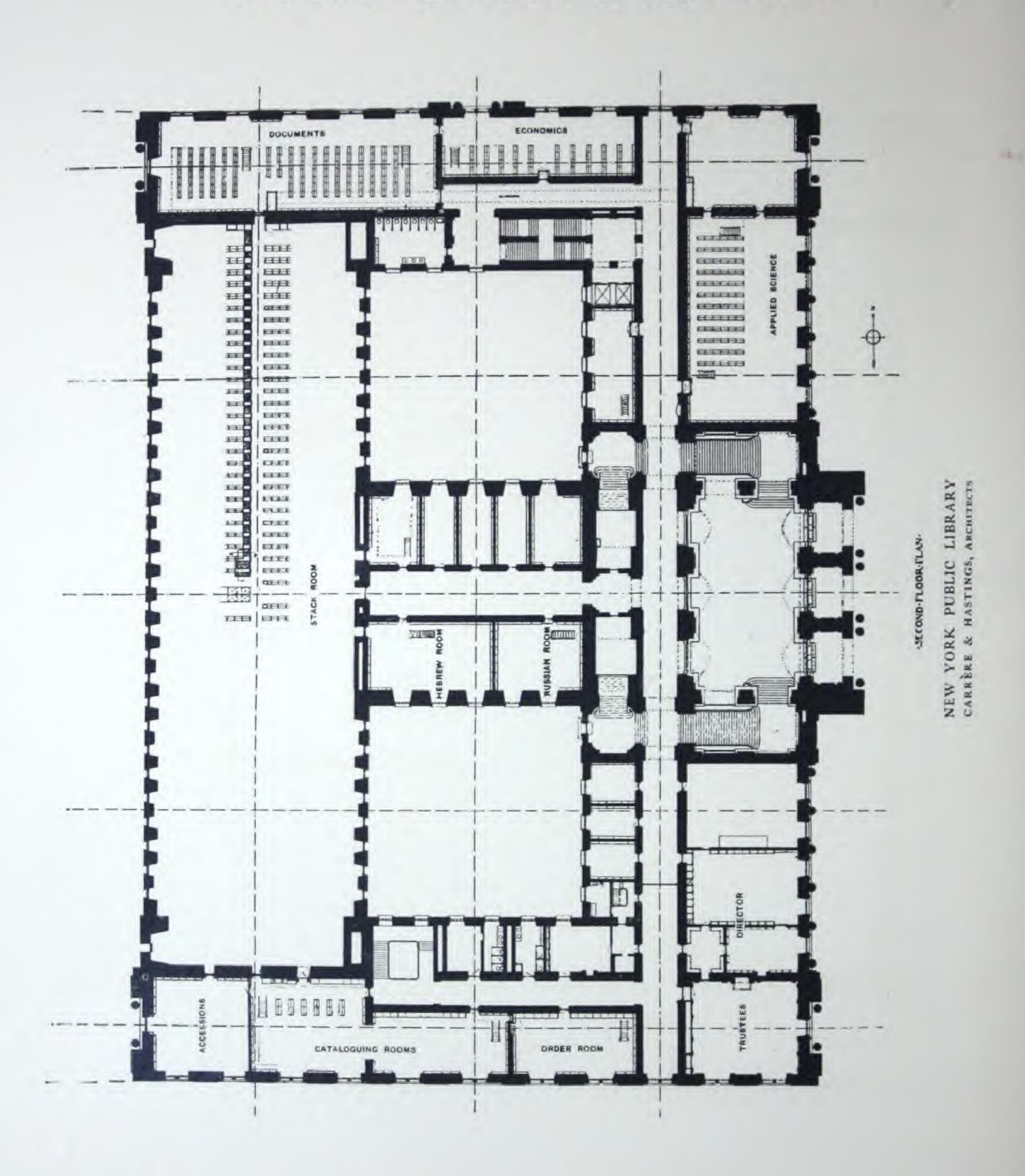
FRONT ELEVATION, NEW YORK PUBLIC LIBRARY CARRERE & HASTINGS, ARCHITECTS



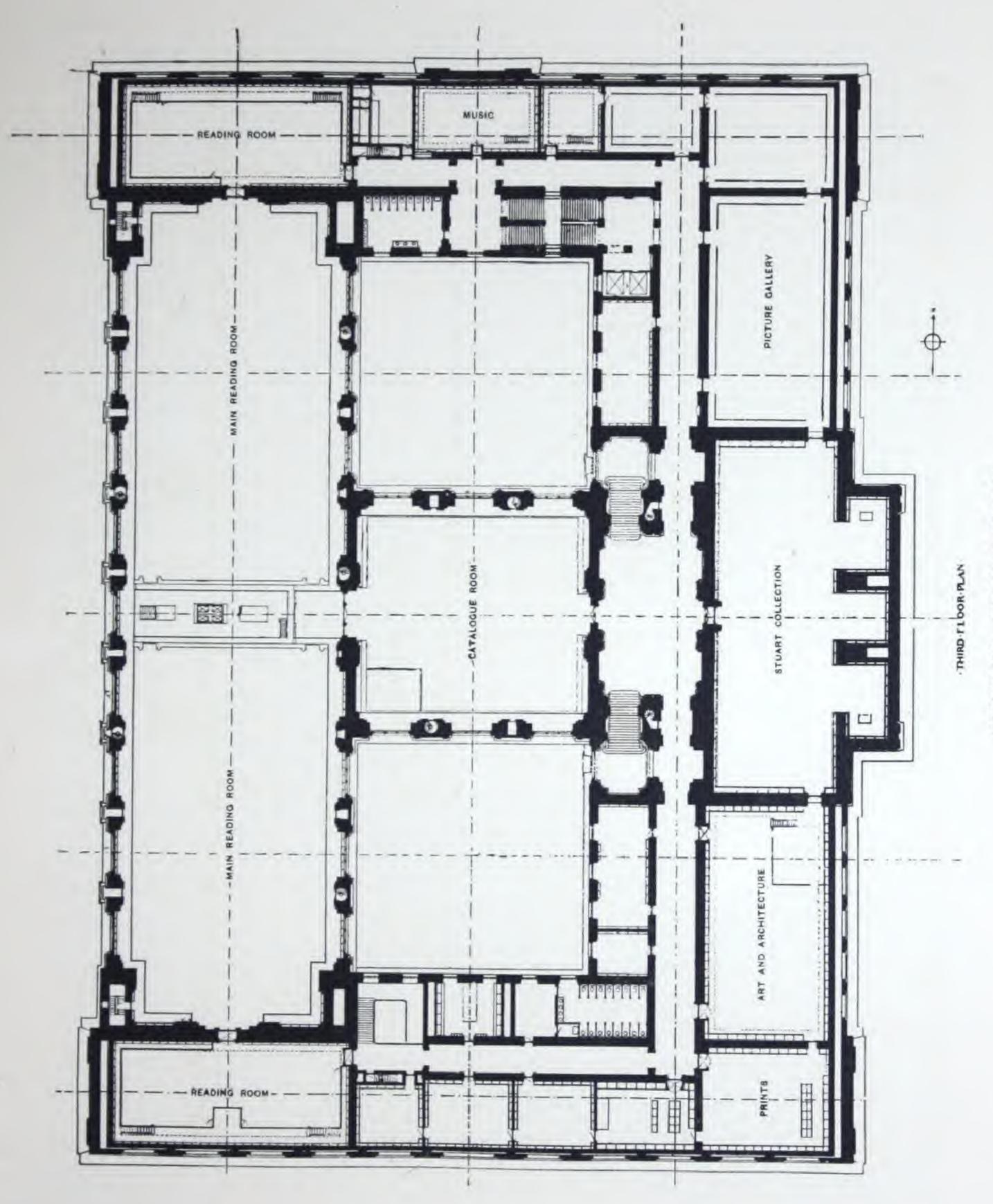
REAR ELEVATION SHOWING STACK ROOM WINDOWS, NEW YORK PUBLIC LIBRARY CARRERE & HASTINGS, ARCHITECTS



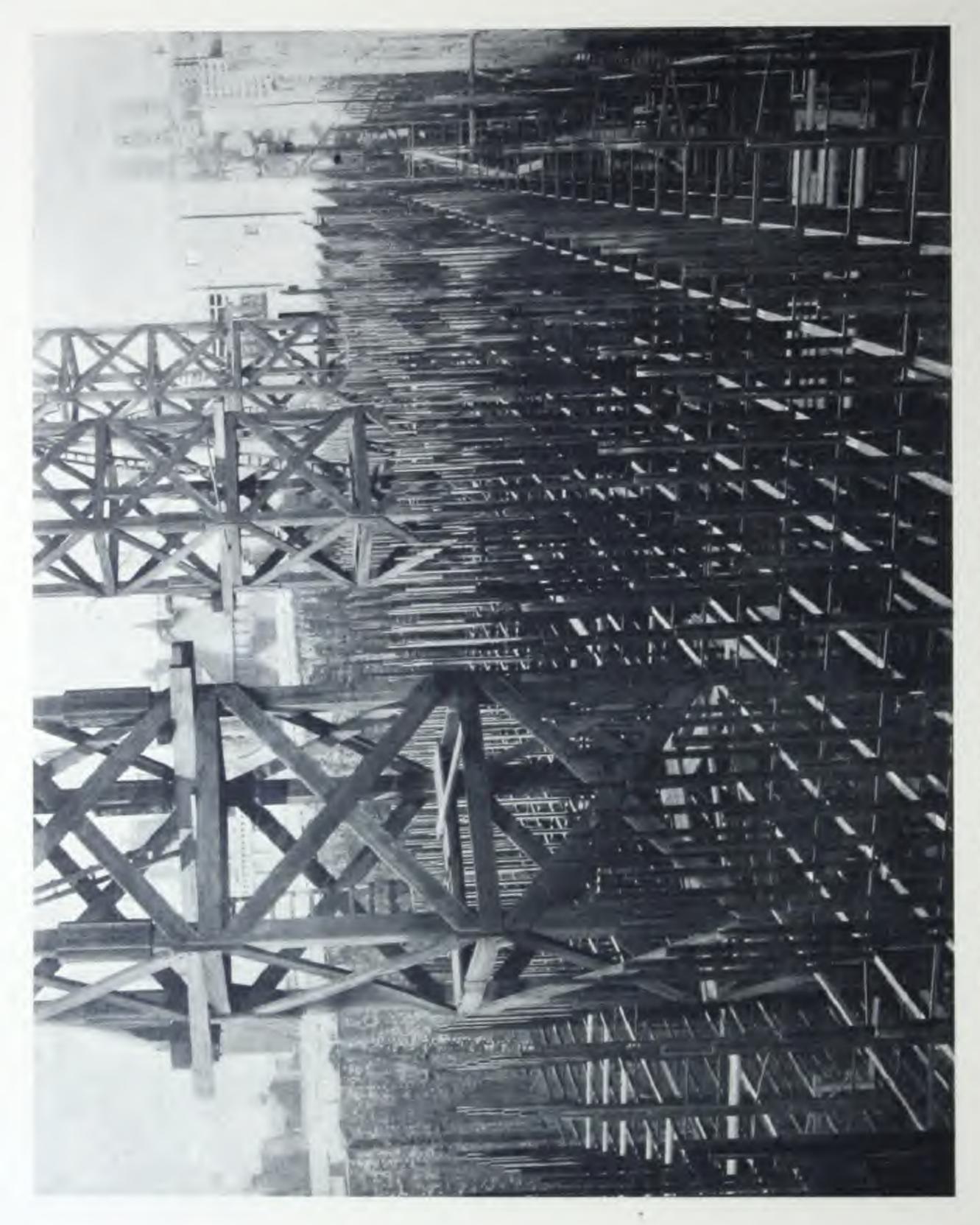
NEW YORK PUBLIC LIBRARY



[90]



NEW YORK PUBLIC LIBRARY CARRERE & HASTINGS, ARCHITECTS



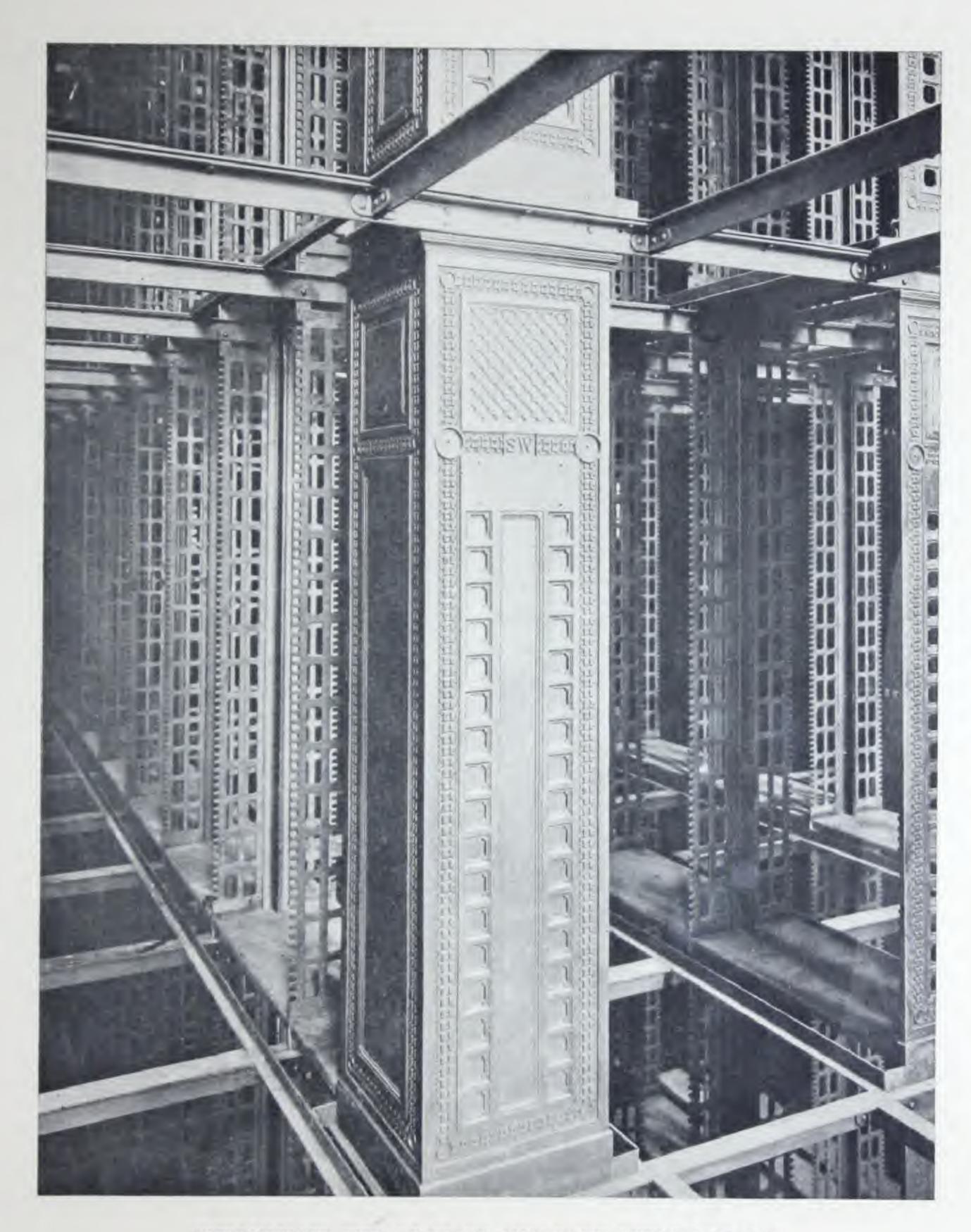
THE STACK FRAME IN PROCESS OF ERECTION, NEW YORK PUBLIC LIBRAR'S CARRERS & HASTINGS, ARCHITECTS



STACK FRAME IN SEVENTH TIER, SUPPORTING READING-ROOM FLOOI CARRERE & HASTINGS, ARC



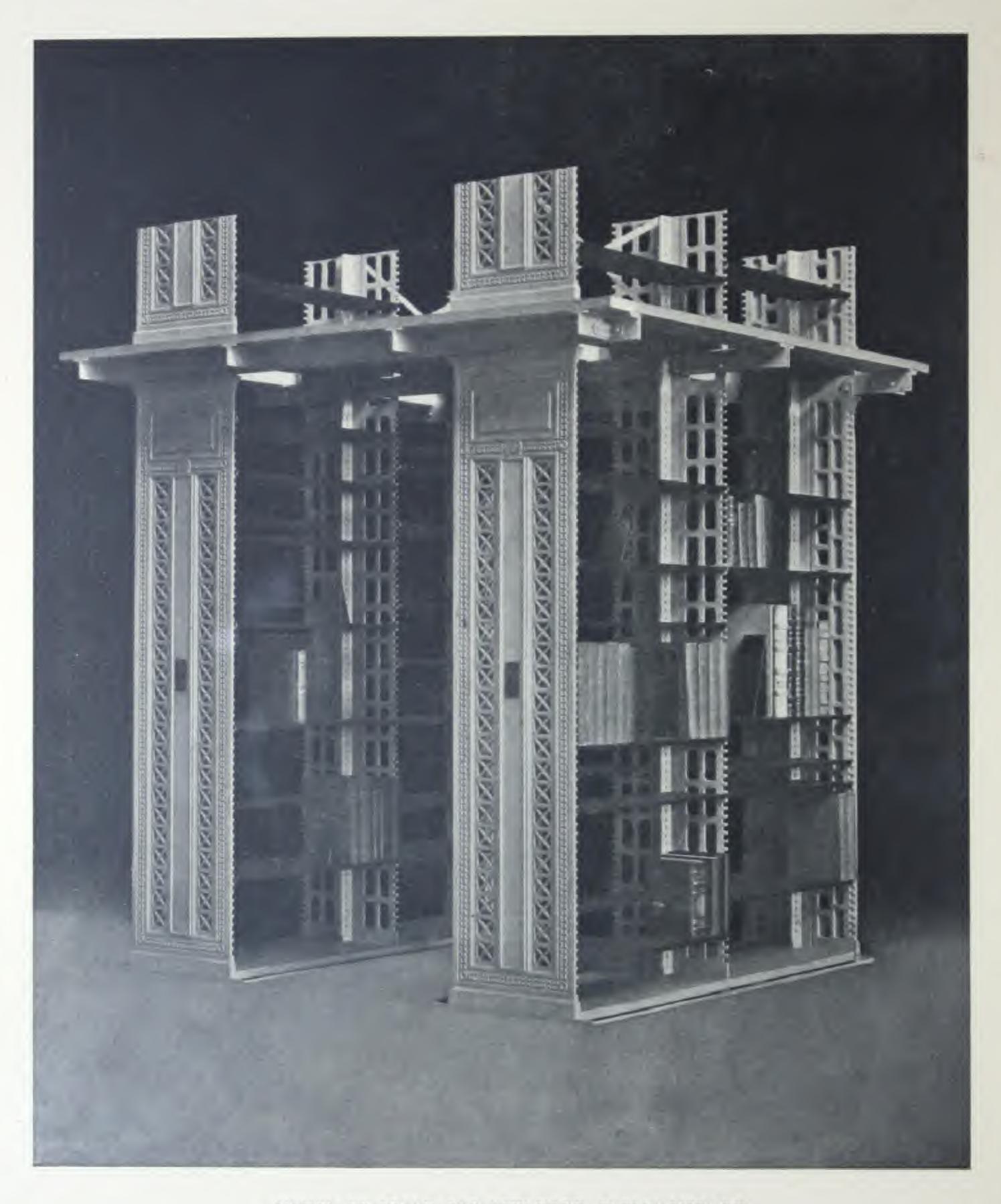
FIRST TIER OF STACK, NEW YORK PUBLIC LIBRARY (ALL FLOORS ARE TO BE COVERED WITH WHITE MARBLE)
CARRERE & HASTINGS, ARCHITECTS



INTERMEDIATE TIER OF STACK, NEW YORK PUBLIC LIBRARY

(SHOWING VENTILATING DUCT ENCLOSED WITH CAST IRON PLATES)

CARRERE & HASTINGS, ARCHITECTS



MODEL OF STACK FOR NEW YORK PUBLIC LIBRARY CARRERE & HASTINGS, ARCHITECTS

TYPICAL PLANS AND ILLUSTRATIONS OF

SMALLER LIBRARIES EQUIPPED WITH BOOK STACKS

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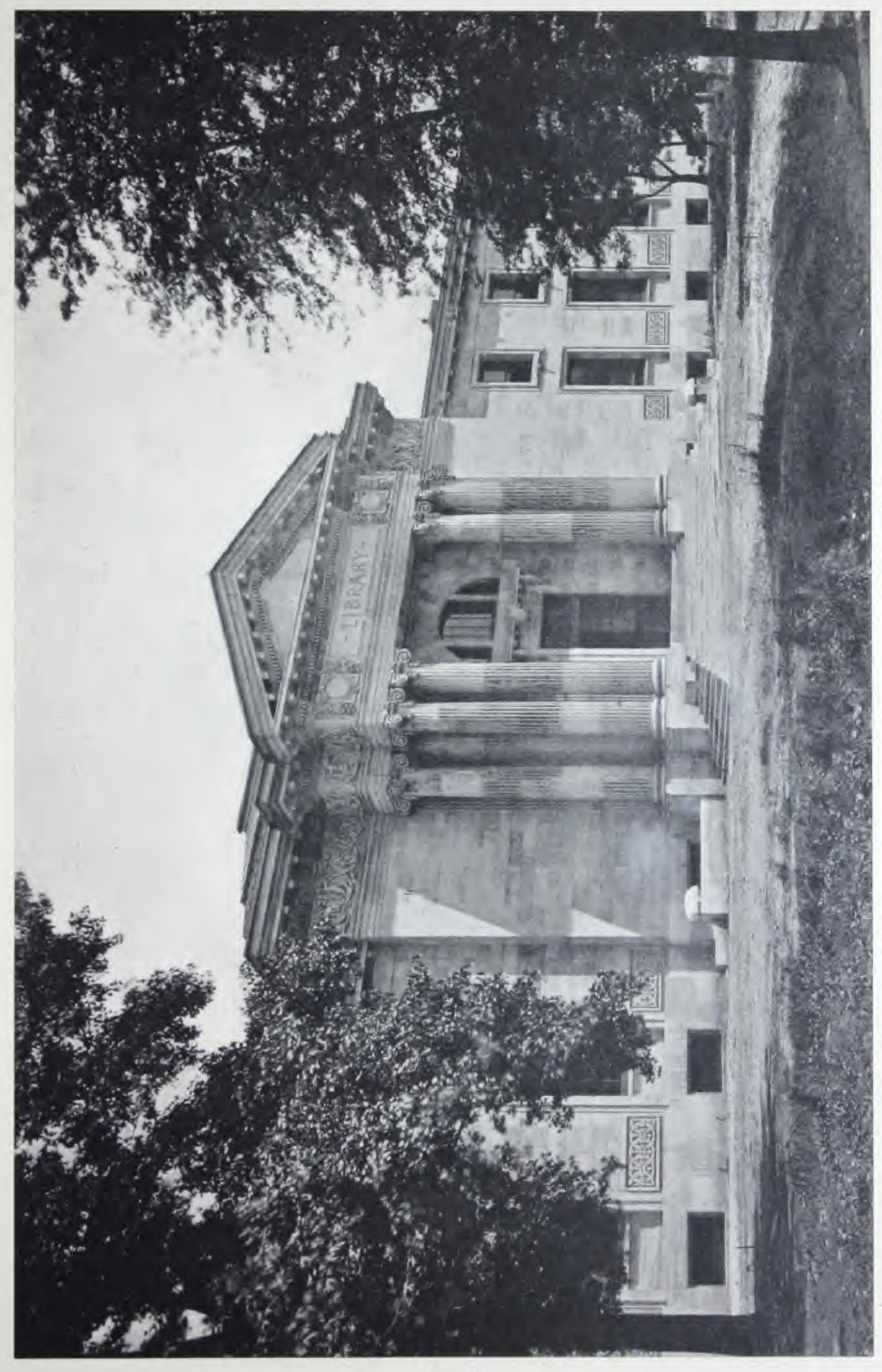
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LOUISVILLE FREE PUBLIC LIBRARY, LOUISVILLE, KY.

LOUISVILLE FREE PUBLIC LIBRARY LOUISVILLE, KY.

PILCHER & TACHAU, ARCHITECTS

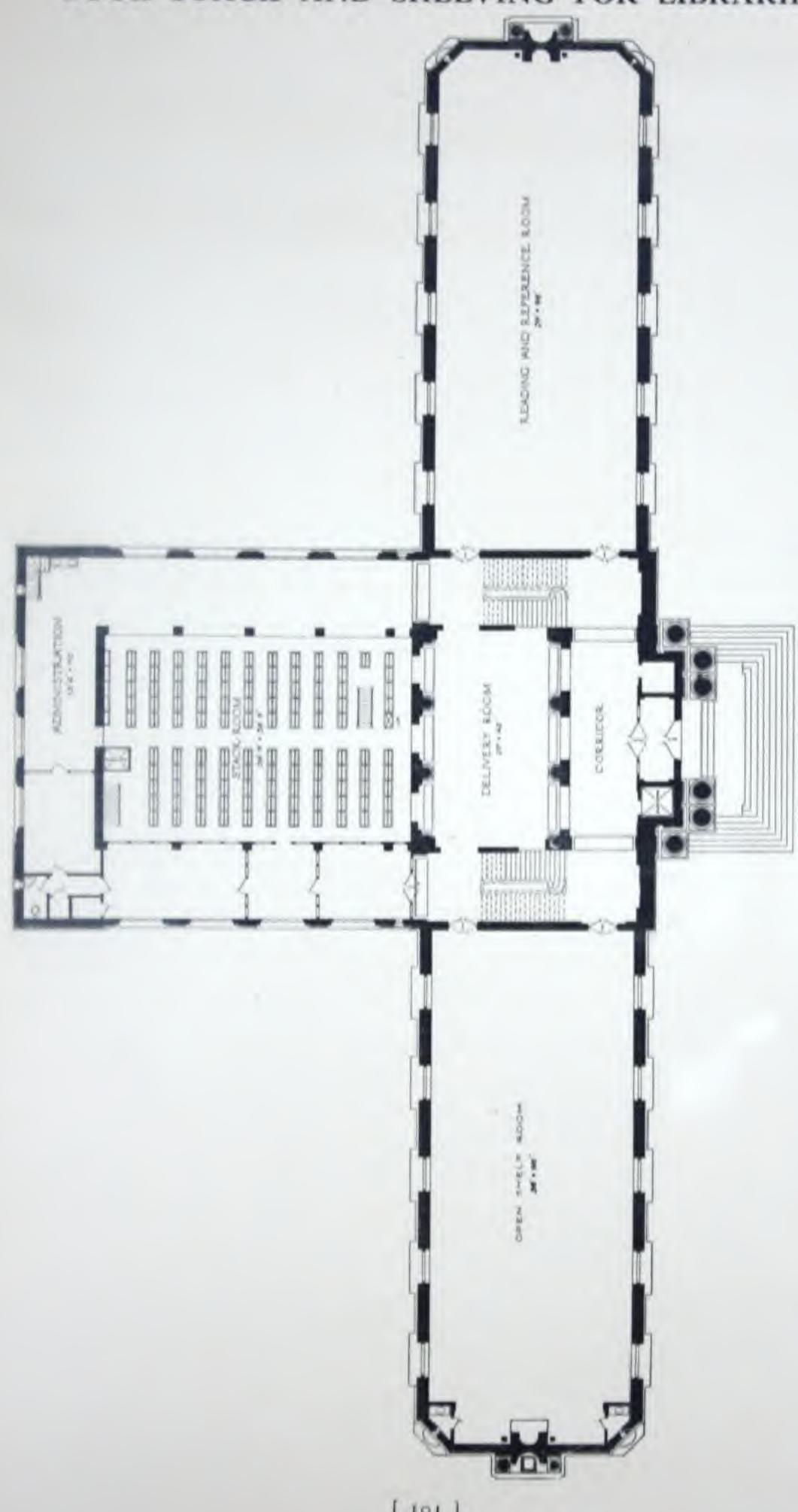
THE general plan of this building is T-shaped with the entrance at the center, the public rooms in front, the stack room and office rooms in the rear in the base of the T.

On the main floor the delivery desk is immediately in front, with a large reading room and reference room to the right, and an open shelf room to the left where 20,000 volumes will be accessible to the public. Immediately back of the delivery desk is the stack room of five floors with a capacity of over 200,000 volumes, and around it in the basement and first stories are offices, order, cataloguing and supply rooms.

On the second floor the left wing is occupied by the children's room and a small annex for teachers. The right wing has class, study and art rooms. There is a third story over the delivery room which will be used for museum purposes. The two upper floors of the stack rise above the roof and are lighted directly through windows opposite each aisle.

In the basement a lecture room with janitor and service rooms are located in the left wing, and in the right wing are rooms for newspapers and public documents. Immediately under the delivery room is the fan, air-washing and other machinery. This building is equipped with a vacuum cleaning system and in the stack room an electric elevator and book lift have been installed.

The general outline of the building is conventional but the arrangement of the stack and work rooms is unique. A very strong point is the compactness of the whole arrangement centering at the delivery desk, which makes it well adapted for work.



LOUISVILLE FREE PUBLIC LIBRARY, LOUISVILLE, KY. PILCHER & TACHAU, ARCHITECTS



LOUISVILLE FREE PUBLIC LIBRARY, LOUISVILLE, KY. PILCHER & TACHAU, ARCHITECTS



EVANSTON PUBLIC LIBRARY, EVANSTON, ILL. JAS. GAMBLE ROGERS AND CHAS. A. PHILLIPS, ARCHITECTS

EVANSTON PUBLIC LIBRARY, EVANSTON, ILL.

JAS. GAMBLE ROGERS AND CHAS. A. PHILLIPS, ARCHITECTS

THE general dimensions of this building are 109 feet front by 90 feet in depth and the construction is fireproof throughout with the exception of the interior wood trim. The exterior is a beautiful example of simple classical design.

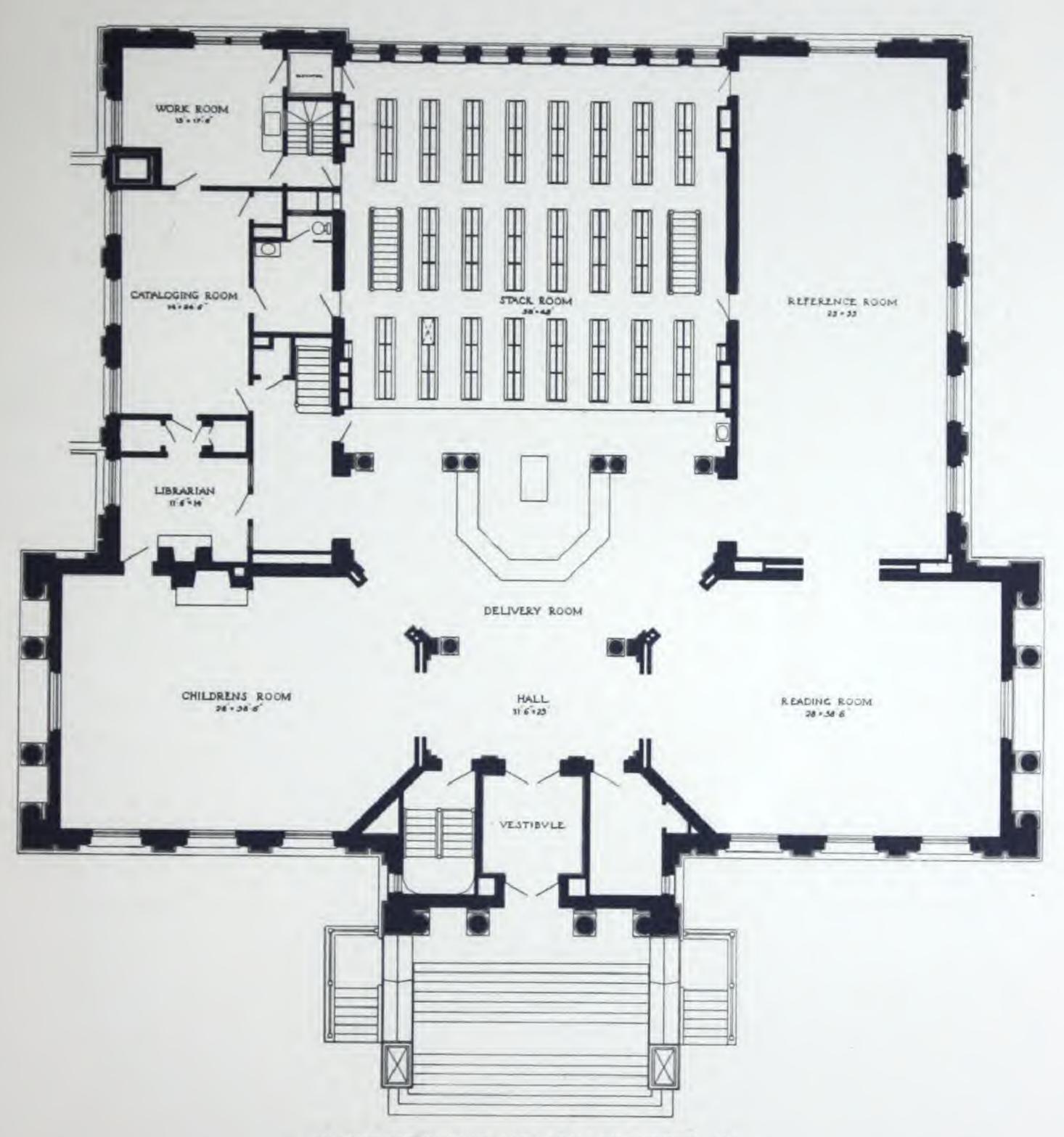
On the first floor the vestibule opens directly into the delivery hall beyond which are the loan desk and the stack room. At either side of the hall are the reading room and children's room, a view of each of these rooms being easily commanded from the loan desk.

The stack room extends to four stories in height; the basement tier is 11 ft. 4 in. high, the next two tiers 7 ft. 6 in., and the fourth tier 6 ft. 6 in. high, with a total capacity of about 103,000 volumes. A skylight extends over nearly the entire area of this room.

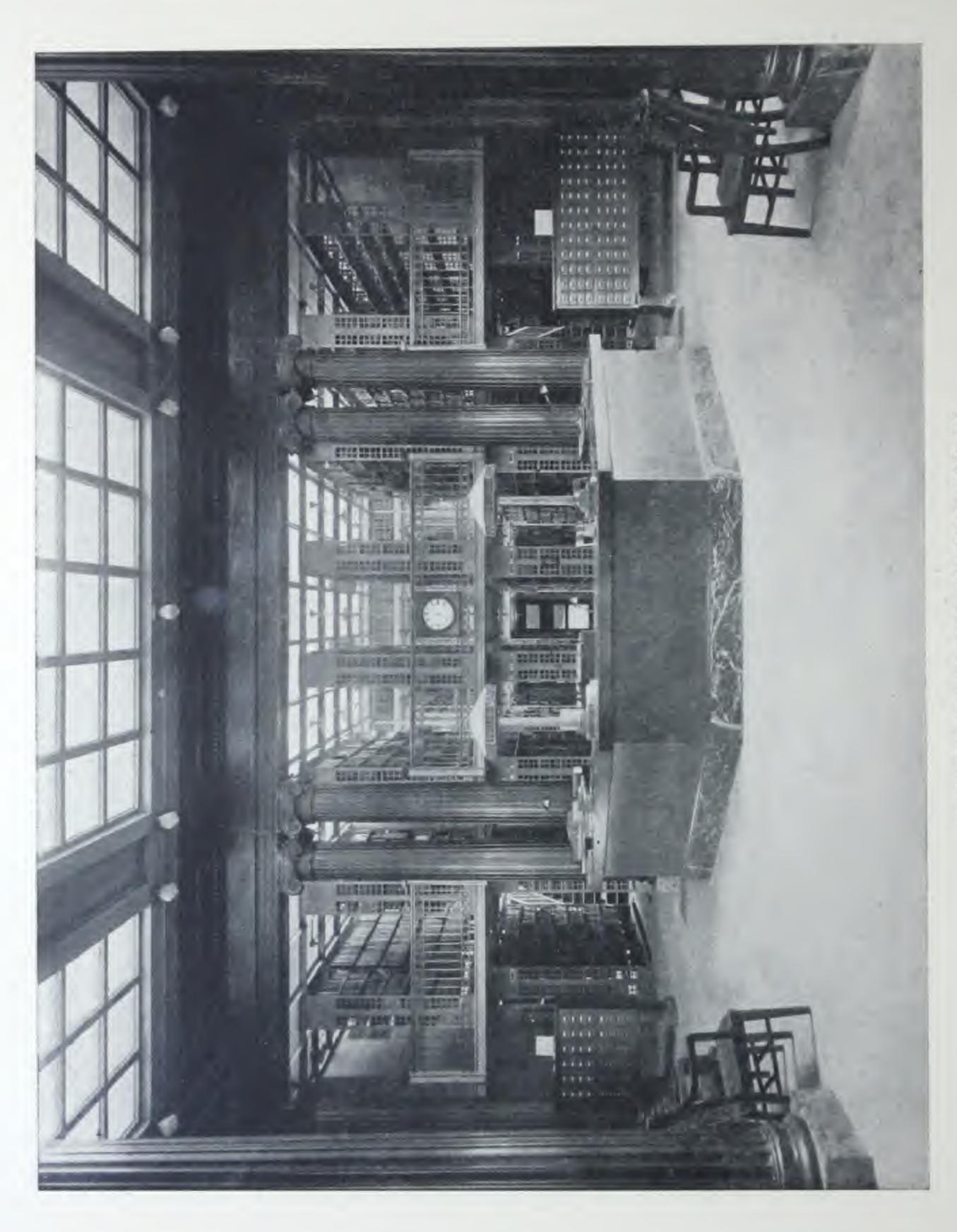
The three walls of the stack room are laid up in a light buff colored face brick with all external angles rounded. The columns at the front of this room and all of the principal rooms in the first story are finished and furnished in mahogany.

Opening to the right of the stack room and connecting with the reading room is a large reference room 23 feet by 55 feet. At the left are the librarian's office and work rooms, and directly over them is the mezzanine story containing the directors' room, music room, the staff room and lavatory.

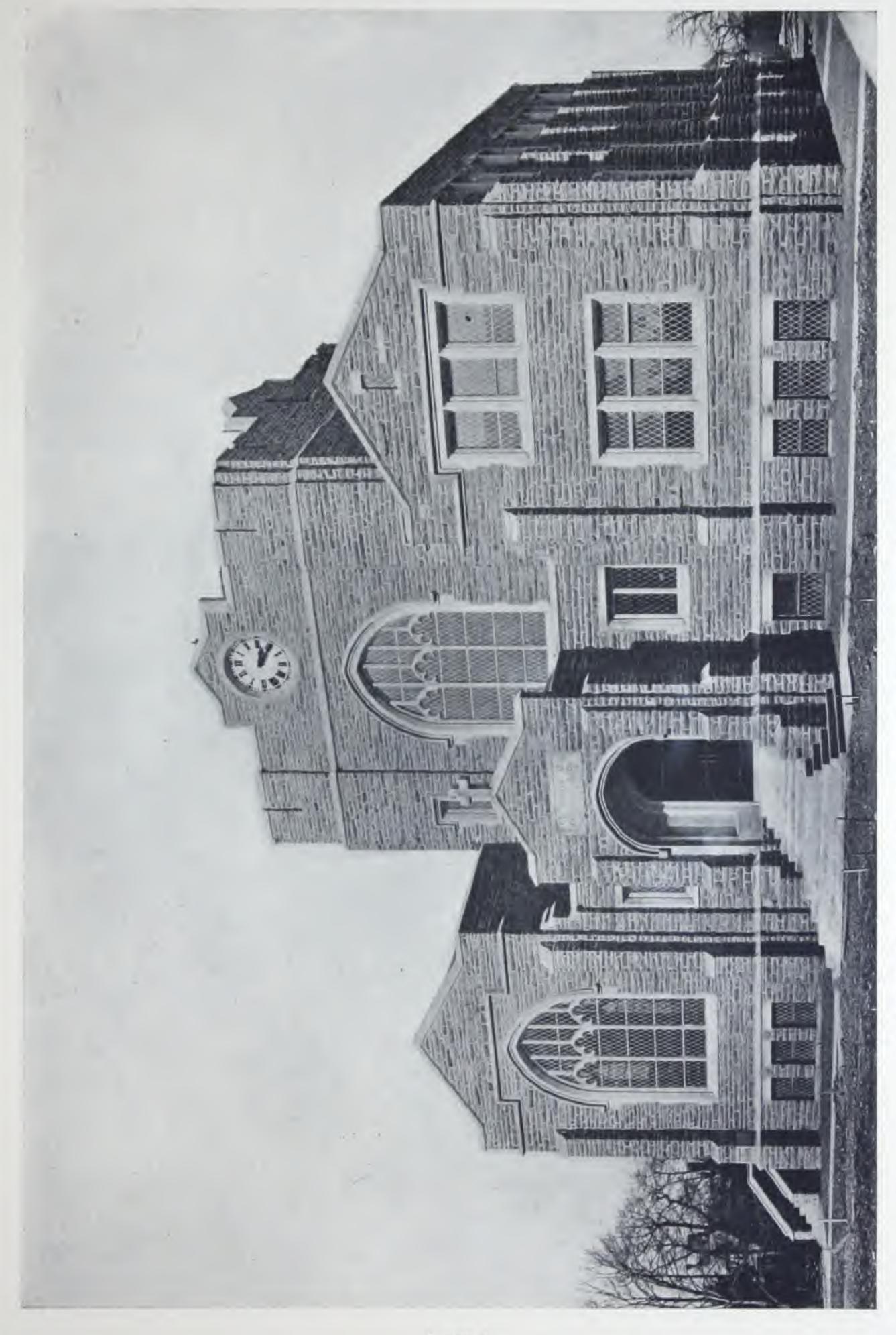
An audience or lecture room designed to accommodate about one hundred and fifty persons is provided in the basement, also a room for the use of the Evanston Historical Society, a room for boys and space for the janitor's quarters, men's lavatory, the heating and ventilating plant and the unpacking room.



EVANSTON PUBLIC LIBRARY, EVANSTON, ILL.
JAS. GAMBLE ROGERS AND CHAS. A. PHILLIPS, ARCHITECTS



EVANSTON PUBLIC LIBRARY, EVANSTON, ILL. JAS. GAMBLE ROGERS AND CHAS. A. PHILLIPS, ARCHITECTS



KRAUTH MEMORIAL LIBRARY, LUTHERAN THEOLOGICAL SEMINARY, MT. AIRY, PA. WATSON & HUCKEL, ARCHITECTS

KRAUTH MEMORIAL LIBRARY, LUTHERAN THEOLOGICAL SEMINARY, MT. AIRY, PHILADELPHIA, PA.

WATSON & HUCKEL, ARCHITECTS

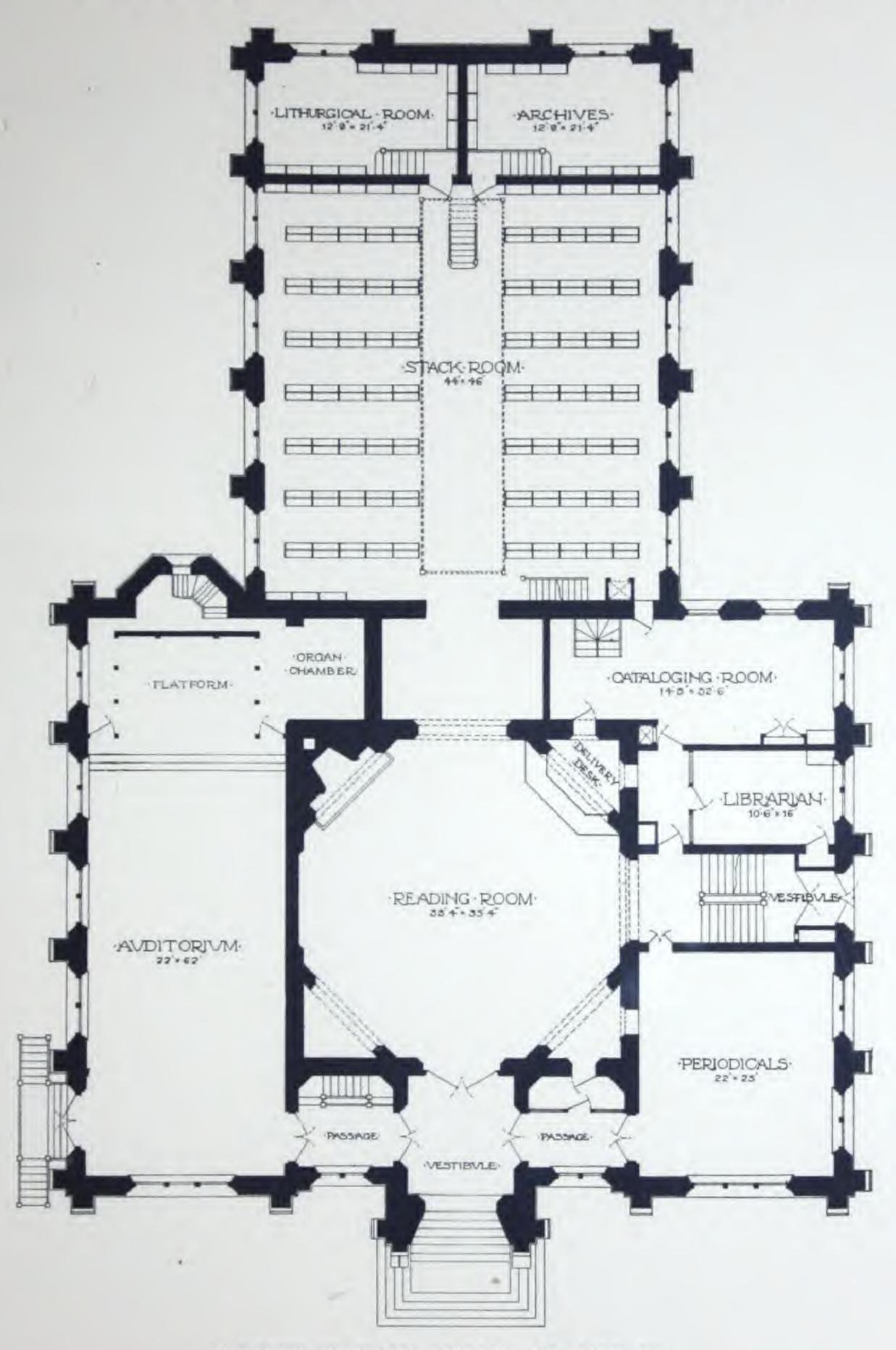
THE building consists of a central tower, two wings and a rear extension for the stack. The reading room, the central feature of the building, is about 35 feet square and 61 feet high, running through two stories to the roof, with an octagonal gallery at the second floor where are hung portraits, engravings, etc. This room is lighted by great upper windows and by a skylight.

The stack room is entirely fireproof, being separated from the rest of the building by a solid wall of masonry and "fire doors." There are three tiers of bookstacks, each 7½ feet in height, with glass floors between the stories; the total capacity of the stack is 98,000 volumes. The two rooms for the liturgical library and archives contain wall stacks 12 feet high with a capacity of 7,000 volumes.

The wing containing the auditorium is of one story. This room is for lectures and other purposes, finished in a churchly style and capable of seating 150 persons.

The other wing is of two stories above the basement, containing the periodical, librarian's and cataloguing rooms on the first floor, and a large seminar room and three research rooms on the second floor.

In the basement are found unpacking rooms, bindery, toilets and a large dining hall and kitchen.



KRAUTH MEMORIAL LIBRARY, MT. AIRY, PA.
WATSON & HUCKEL, ARCHITECTS

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KRAUTH MEMORIAL LIBRARY, LUTHERAN THEOLOGICAL SEMINARY, MT. AIRY, P. WATSON & HUCKEL, ARCHITECTS.



BROOKLYN PUBLIC LIBRARY, WILLIAMSBURG BRANCH WALKER & MORRIS, ARCHITECTS

BROOKLYN PUBLIC LIBRARY, WILLIAMSBURG BRANCH, BROOKLYN, N. Y.

WALKER & MORRIS, ARCHITECTS

THE Williamsburg Branch is the largest of the Brooklyn Branches of the Carnegie Library System and occupies a triangular site facing Division Avenue and bounded by Marcey Avenue and Rodney Street, thus securing exceptional lighting for all rooms.

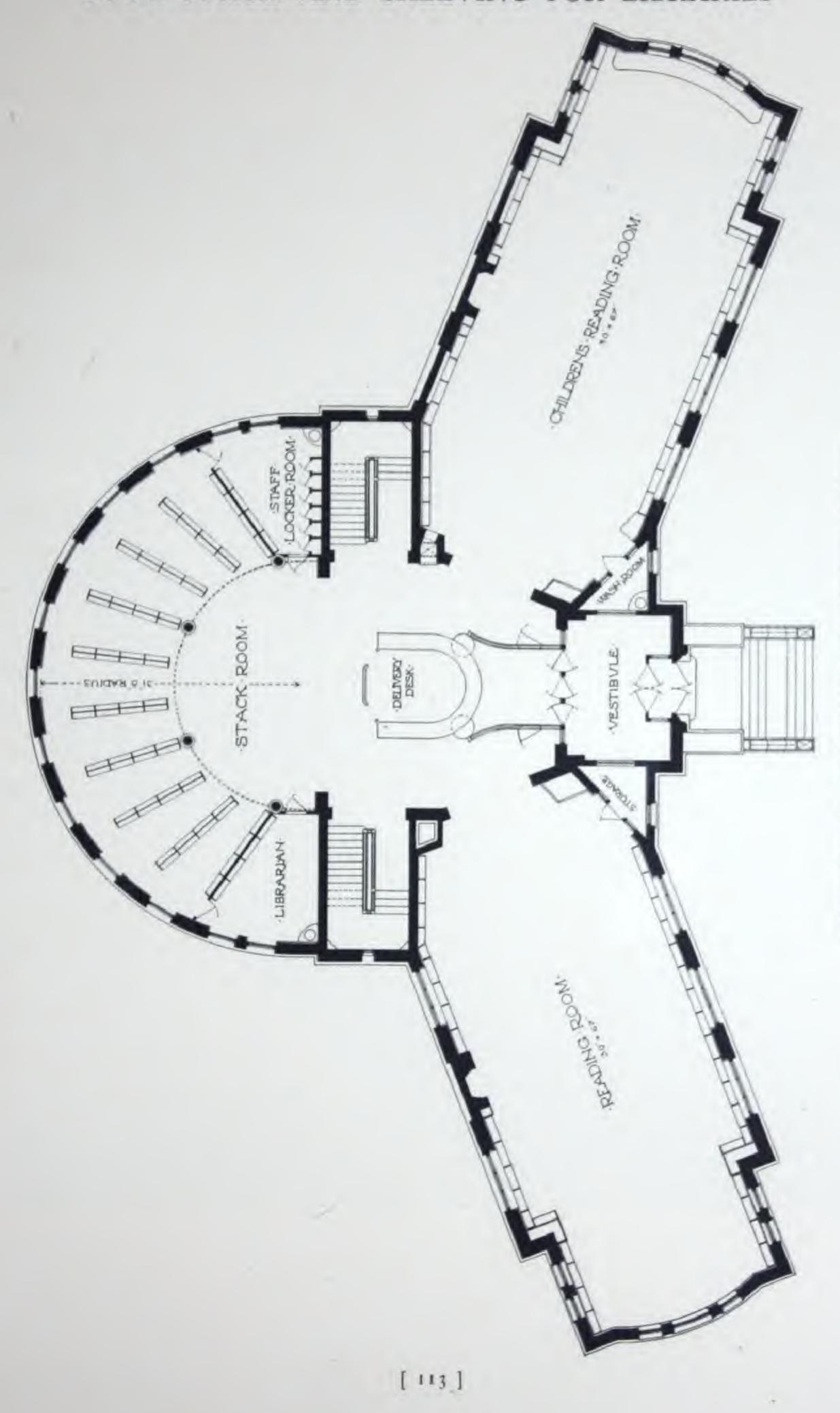
Taking advantage of the peculiarities of the site, the building has been so designed that the central delivery desk is the pivotal point. Here the librarian has complete supervision of all this floor, including even the radial aisles in the stack room; at the same time the children's reading room and the main reading room are effectually separated from each other by the change in the direction of their axes.

The stacks are in two tiers and the intermediate glass floor extends over the librarian's and staff locker rooms at a height of 7 ft. 3 in. above the main floor.

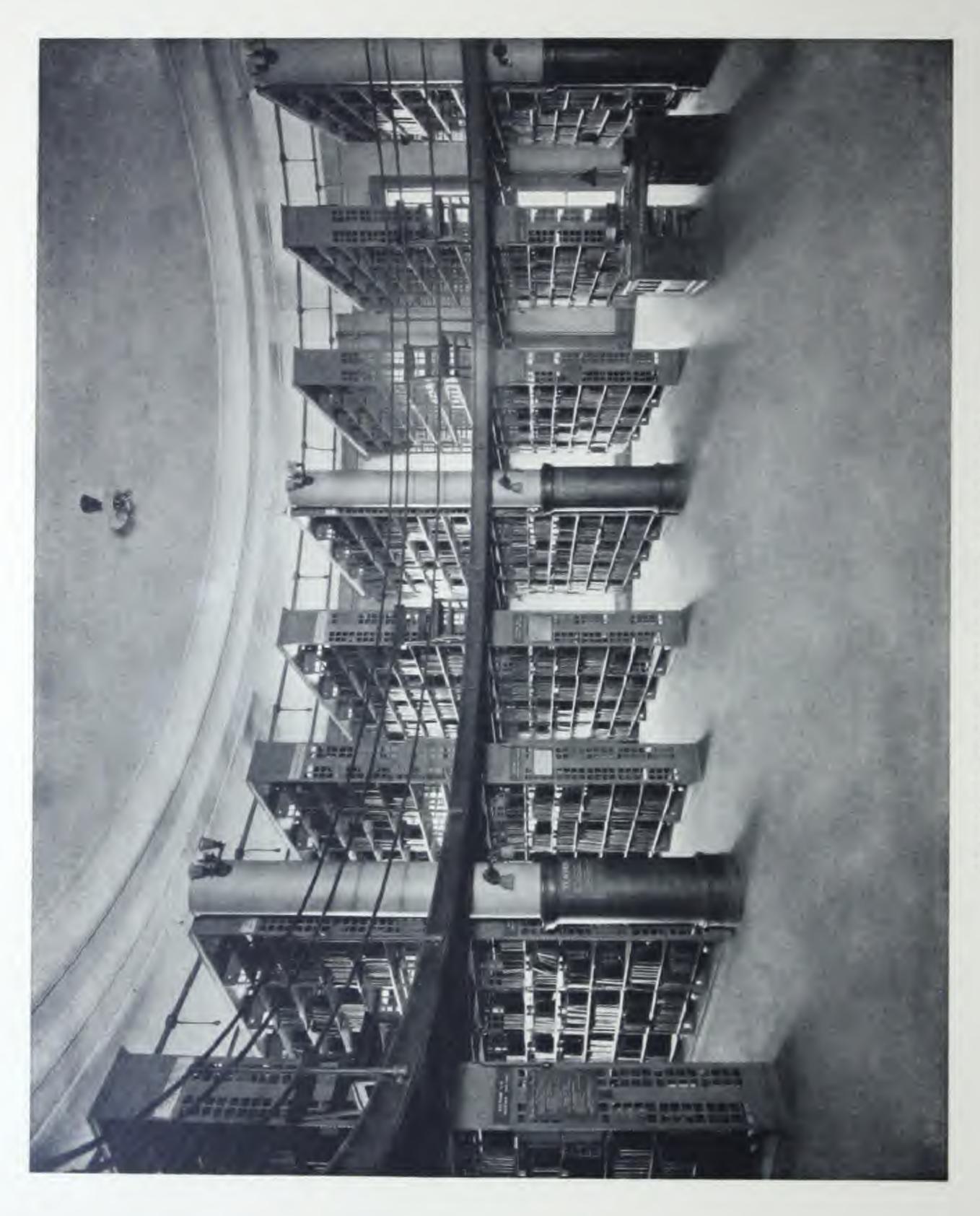
The second story contains reading, reference, cataloguing, storage, librarian's and staff rooms.

In the basement immediately under the main reading room is a lecture hall about 30 ft. by 50 ft. with stage, two anterooms and toilet. The other basement wing contains work and storage rooms, and in the space underneath the stack room will be found toilets, boiler and fan rooms and coal storage.

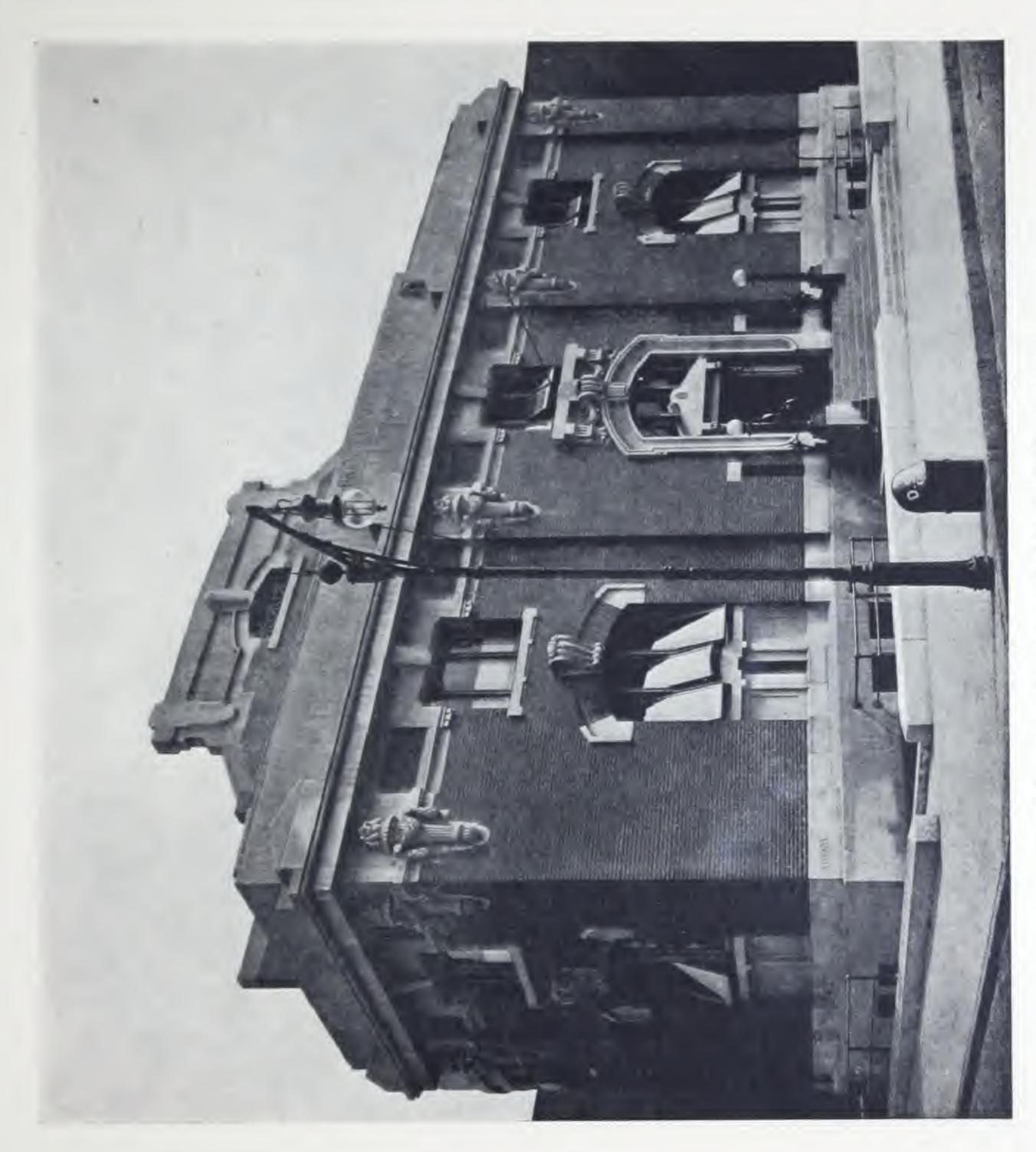
The corner stone was laid November 28, 1903, and the completed building opened to the public for distribution of books on the 30th of January, 1905. Its total capacity including the radial stacks and book shelving is 50,000 volumes. A young men's debating club, school boys' literary club and public lectures held once a week in the auditorium, are educational features carried on in this branch.



BROOKLYN PUBLIC LIBRARY, WILLIAMSBURG BRANCH WALKER & MORRIS, ABCHITECTS



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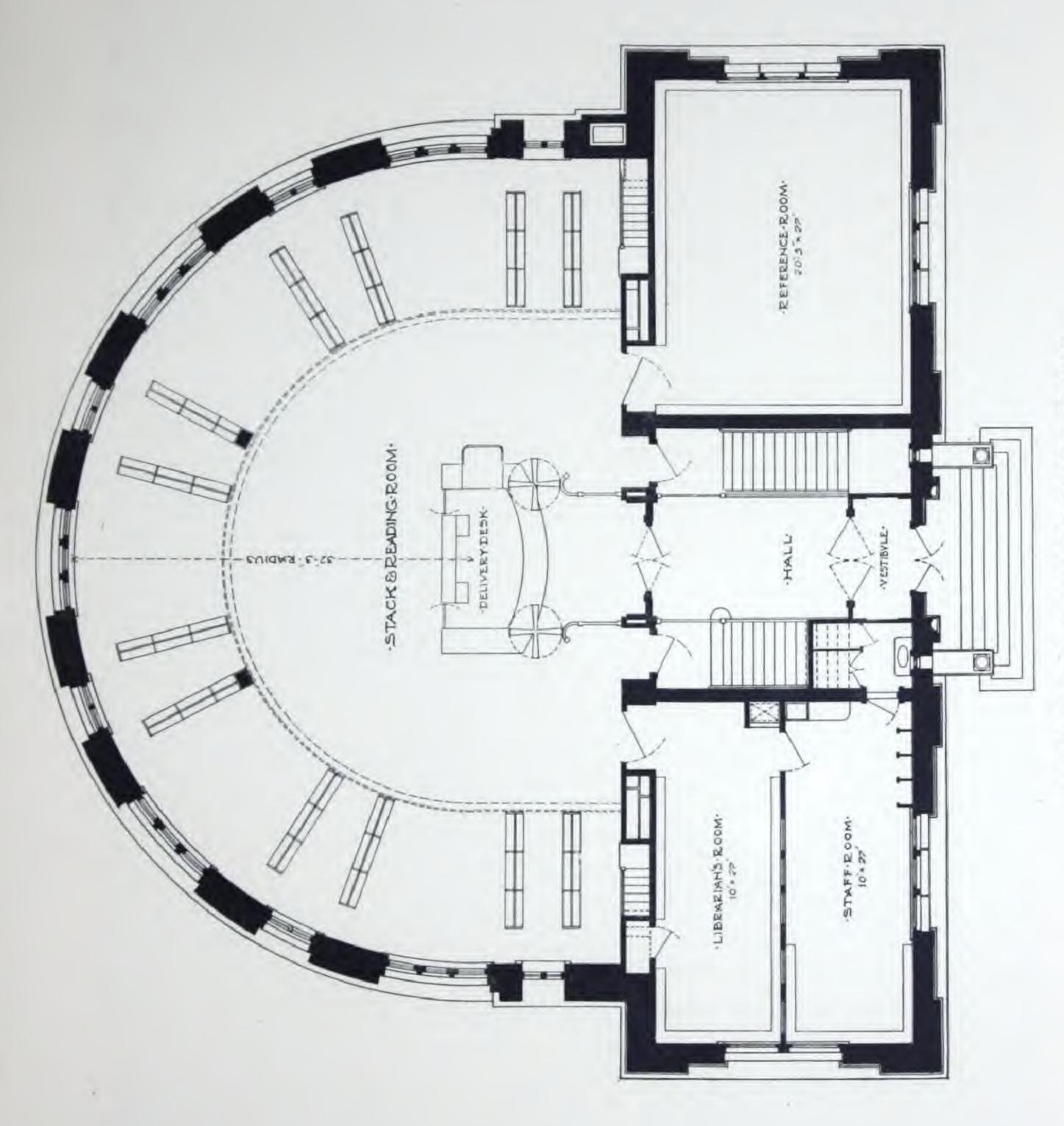
THE Pacific Branch Library is situated at the corner of Fourth Avenue and 12th Street, Brooklyn. The exterior of brick and terra cotta is in good character and well denotes the purpose of the building.

Entering through the vestibule and hall access to the rooms in the first and second stories can be had only through the stack and reading room, thereby causing all visitors to pass in full view of the delivery desk. The radial stacks are grouped in pairs with wide aisles between the groups for the reception of reading tables in each of the two stack tiers. The total capacity of the stacks is 30,000 volumes.

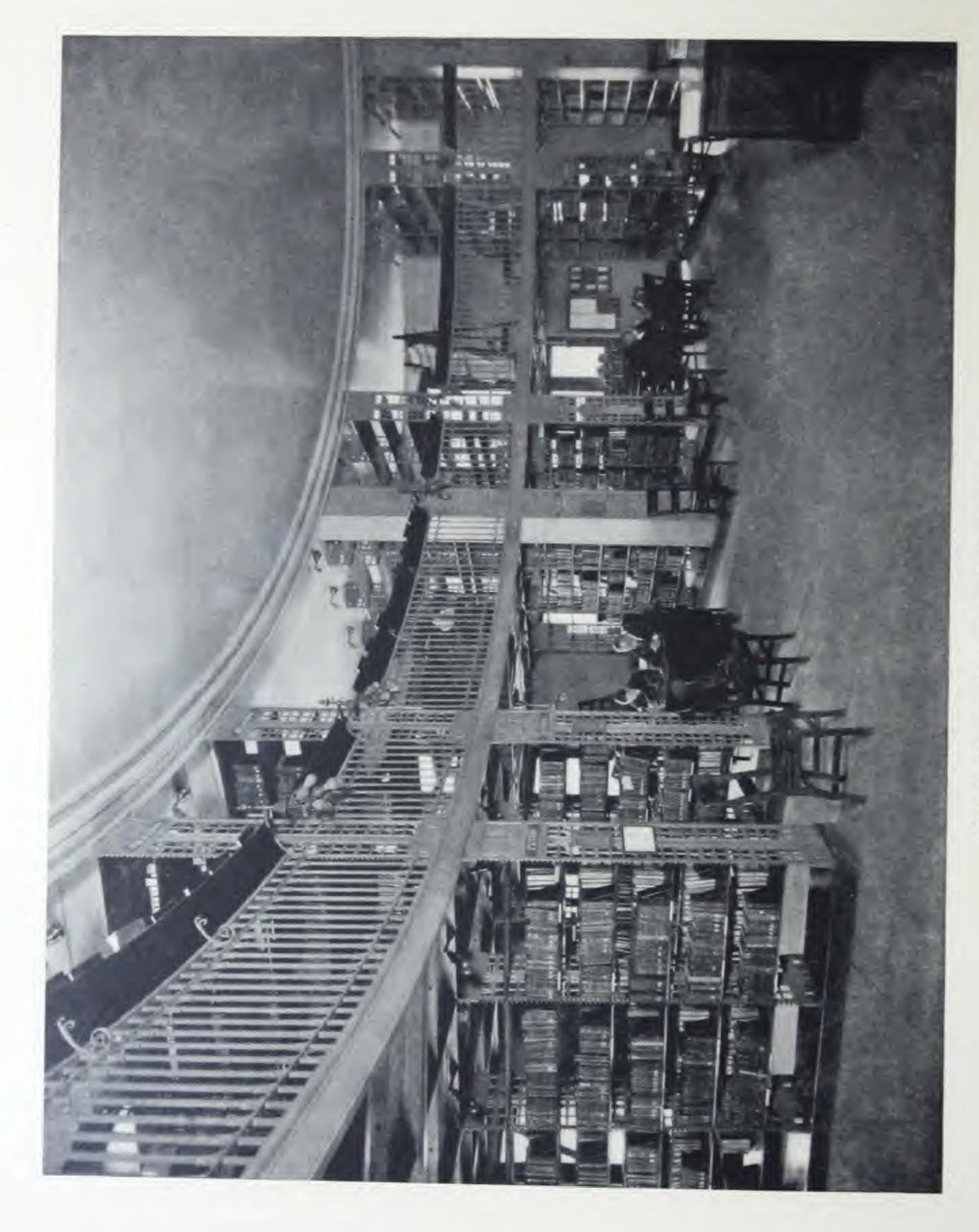
At either side of the hall and entered from the stack room are the reference room, staff and librarian's rooms.

The front basement contains the machinery room, boiler room, work room and toilets. At the rear and occupying the entire area under the stack room is a well lighted lecture hall with anteroom and janitor's room.

A feature of this library is the children's room which occupies the entire second story over the stack and reading rooms. It is fitted with tables, chairs, shelving and a fireplace. At the front of the building in this story two study rooms each 20 feet 6 inches by 27 feet 3 inches are provided.



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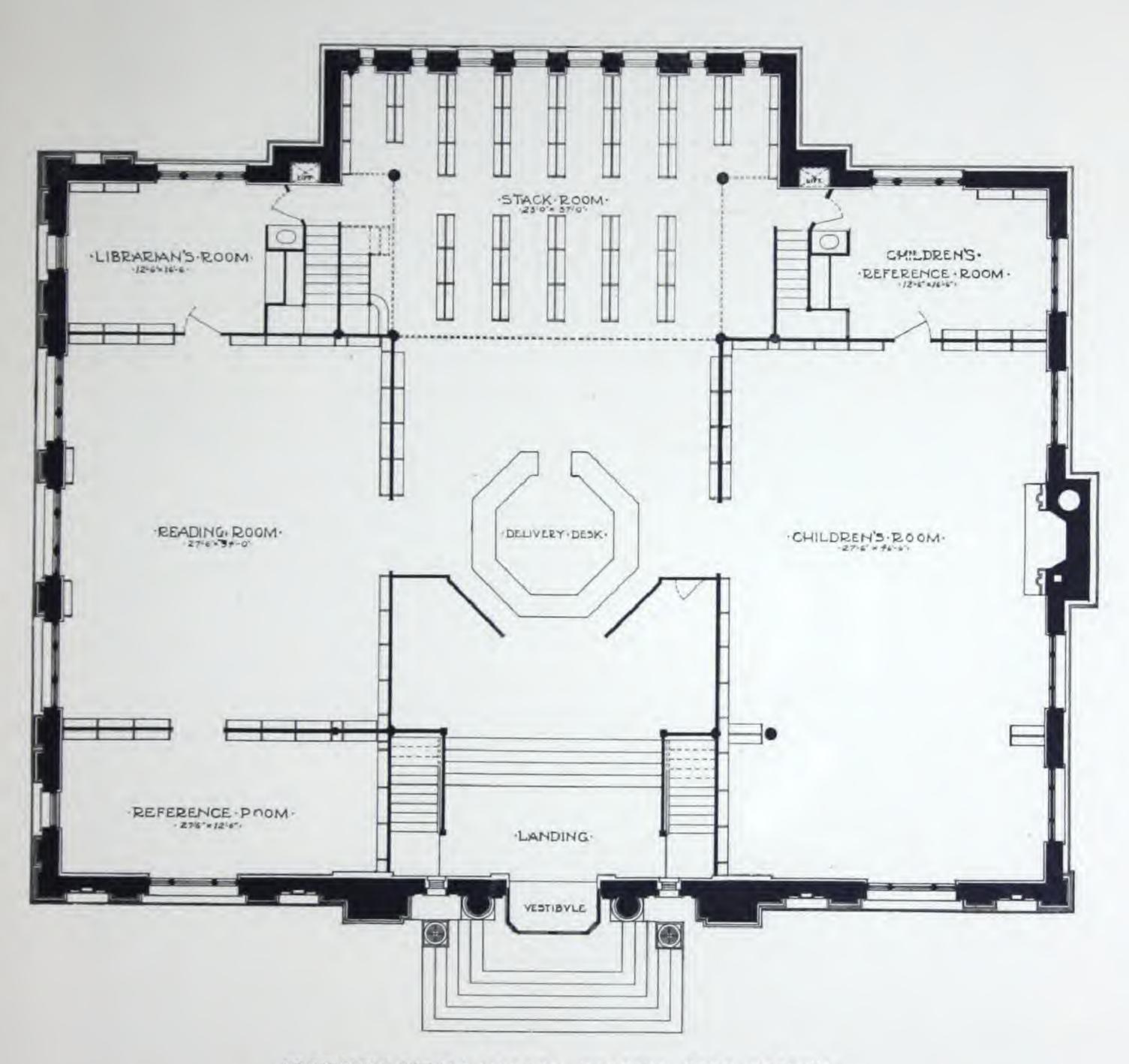
THE plan of this building is radically different from that of either branch library illustrated in the preceding pages but is admirably worked out and adapted to its site. The first story rooms have a ceiling about 21 feet high and are lighted through large windows extending nearly the full height, in addition to which ample skylights are placed over the reading room, children's room and the delivery desk. The partitions between the front rooms in this story are only four feet high, enabling the attendants at the desk to command the entire floor.

At the rear is the stack room 23 ft. by 37 ft. containing two stories of metal stacks with capacity of 29,000 volumes. The outer faces of these stacks have been provided with closed box ends to accommodate the electric conduits and switch boxes that control the lighting of the stack room.

The other public rooms in this building are located in the basement. At the left under the reading room will be found two study rooms each about 12 ft. 6 in. by 16 ft. 6 in. and one study 23 ft. by 33 ft. At the right are the work room and staff room, each 17 ft. by 23 ft. 6 in., a room for the janitor and lavatories for the staff and for the public.

In the center and rear basement directly under the stacks and delivery desk is a fine lecture room 36 ft. 9 in. by 45 ft. fitted with a stage, well lighted and having a direct entrance from the street.

A cellar has been excavated on the right hand side below the staff and work rooms and space provided here for the fan, boiler and coal rooms. The remaining area of the building has not been excavated below the basement floor.



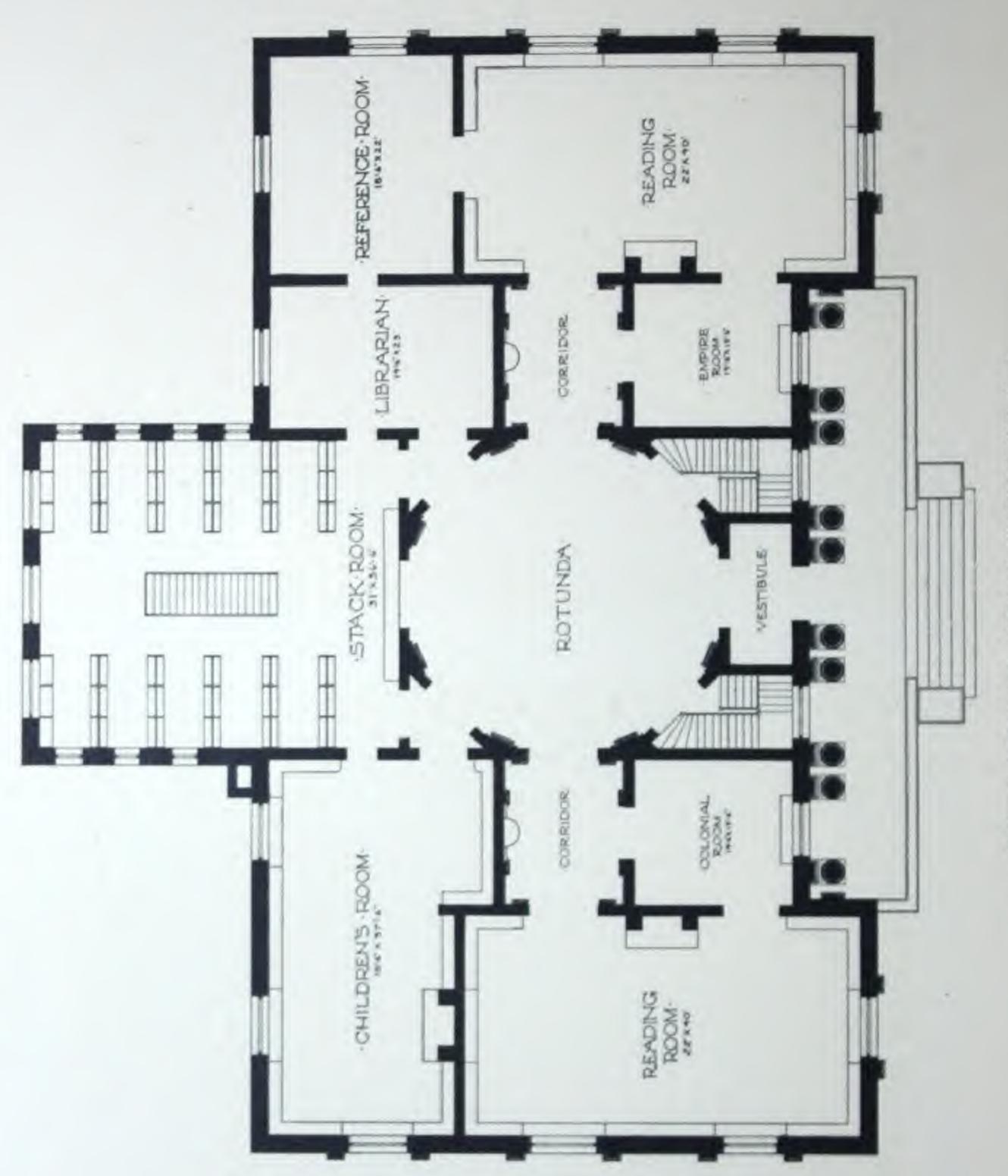
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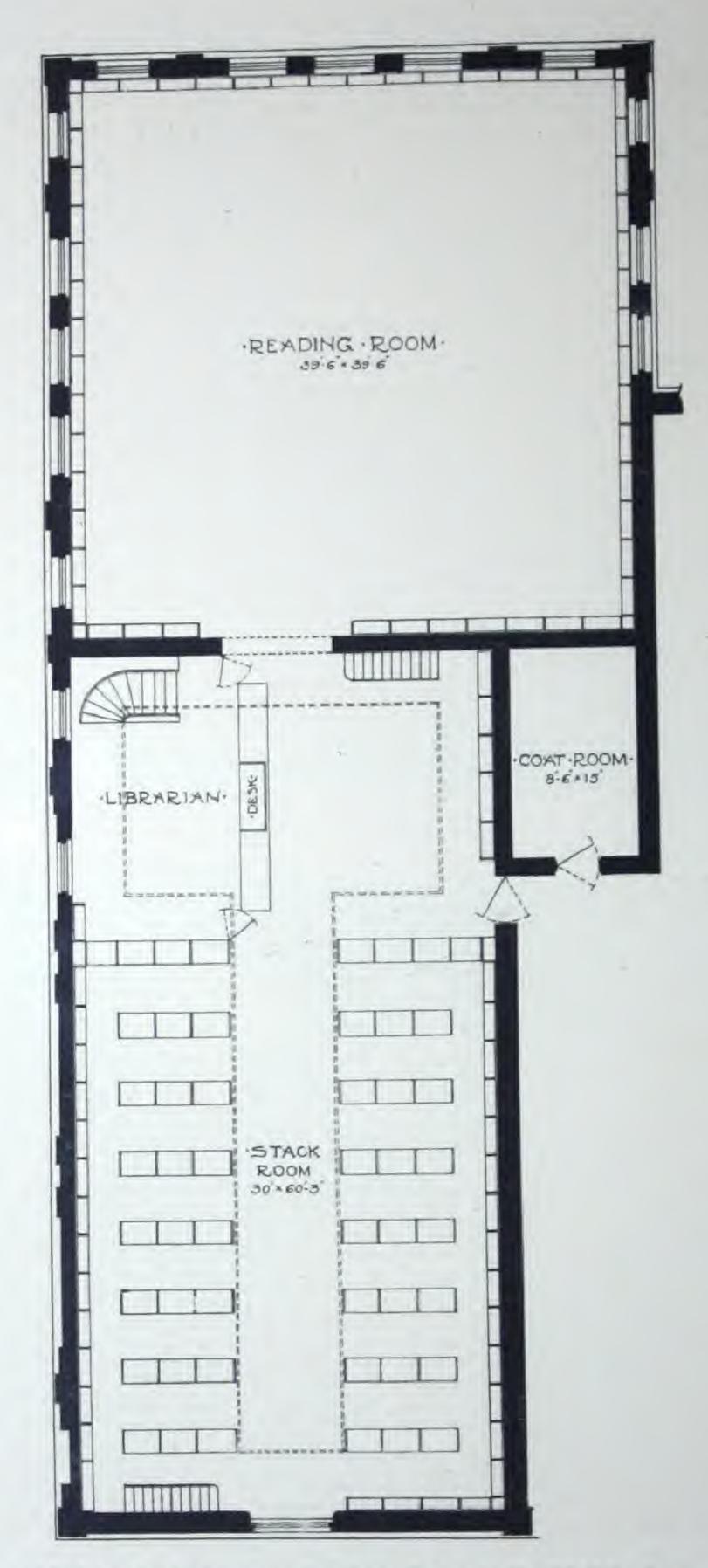


BOOK STACKS IN FIRST STORY



BOOK STACKS IN BASEMENT

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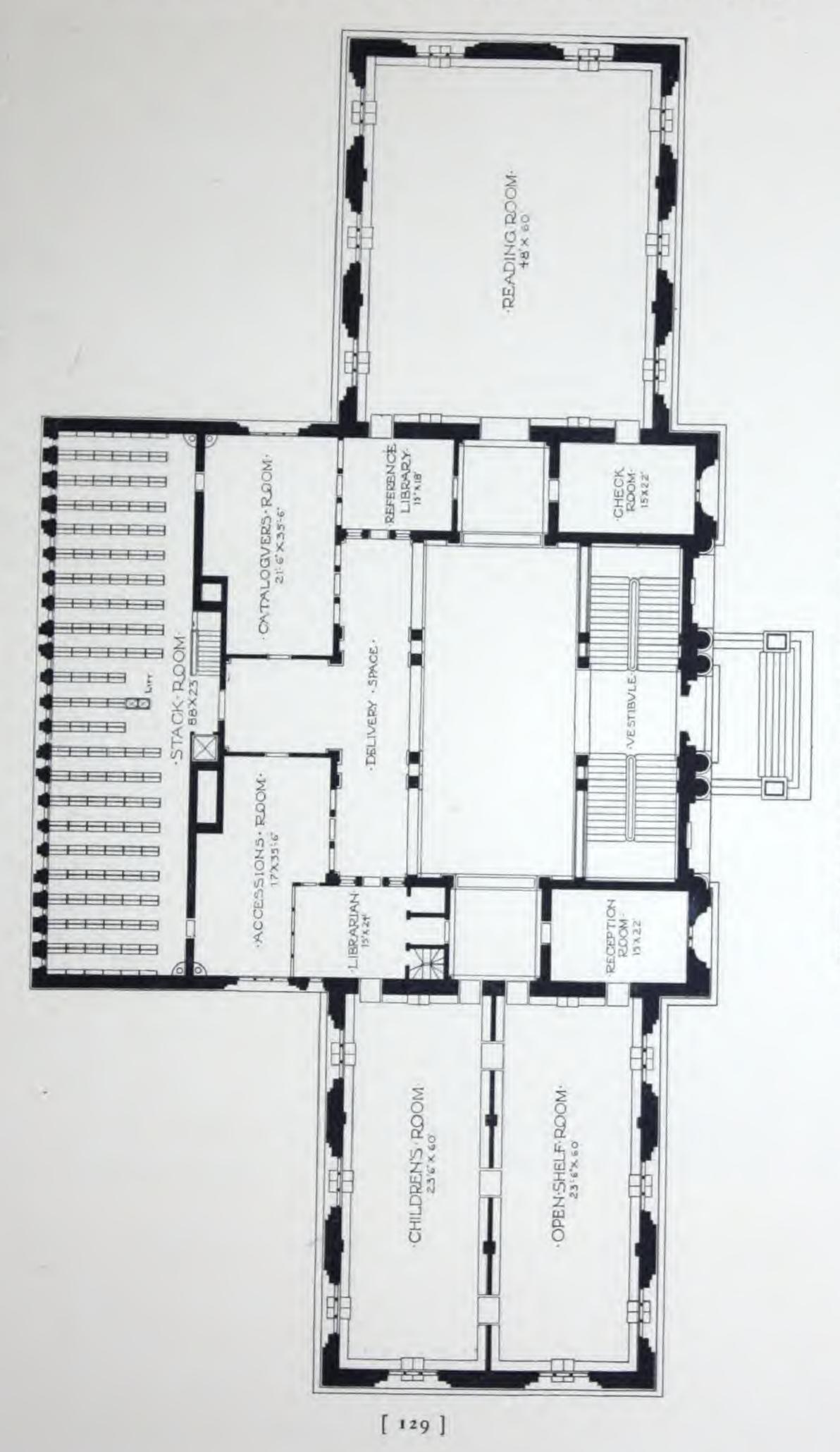
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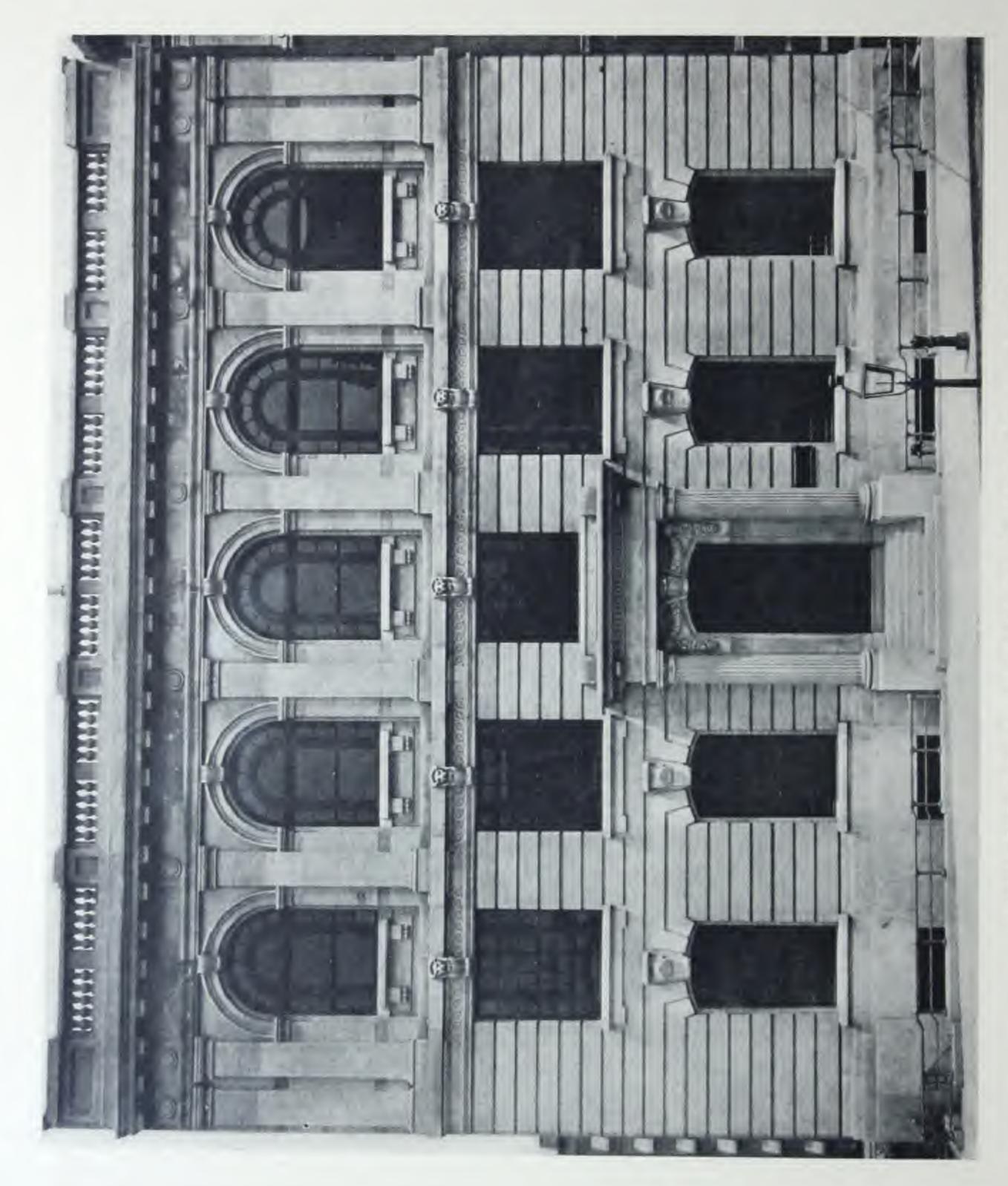
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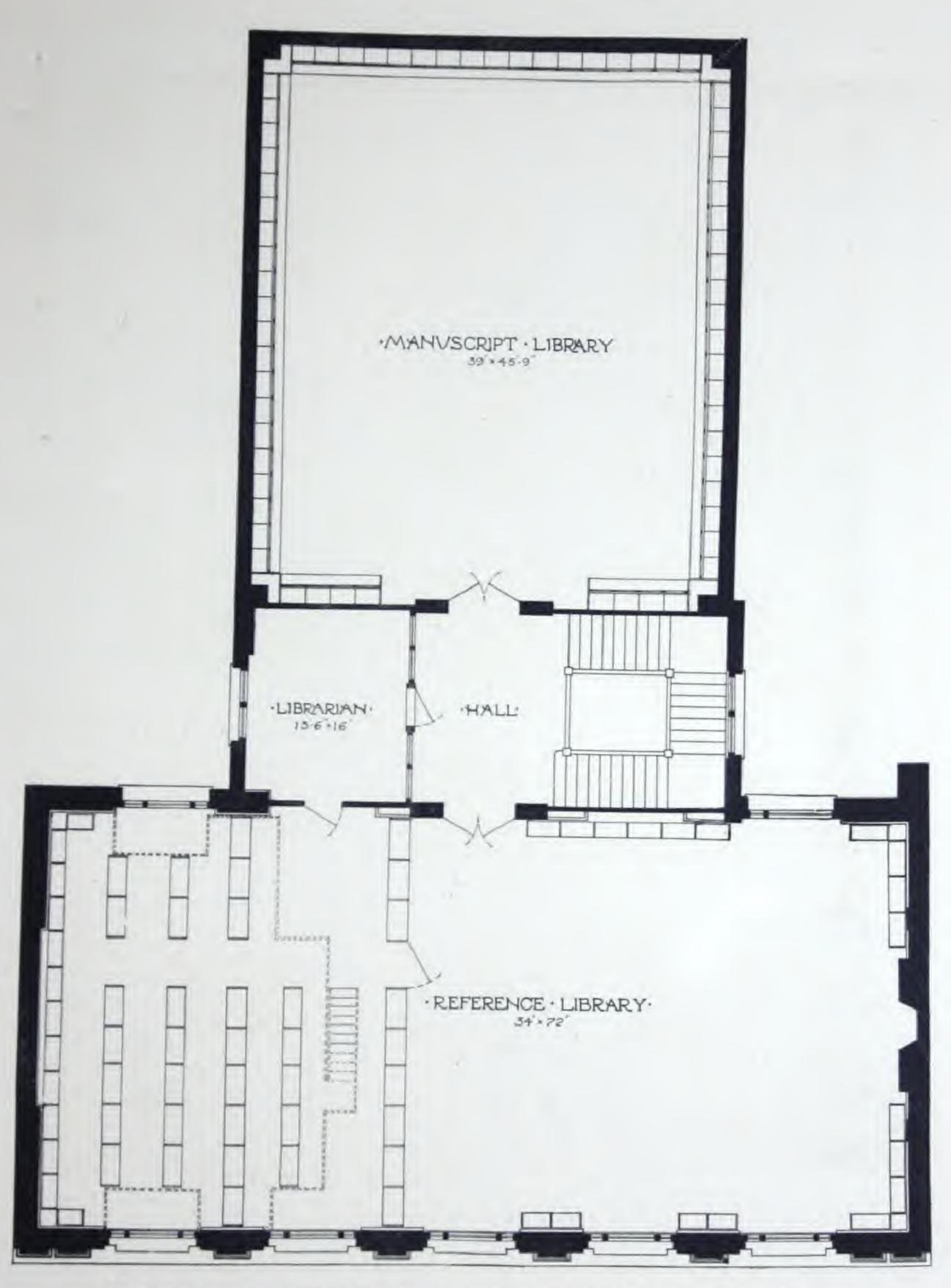
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MANUSCRIPT LIBRARY, JEWISH THEOLOGICAL SEMINARY OF AMERICA, NEW YORK CITY

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THE library rooms of the seminary are located in the third story. In the reference library the books are shelved in the standard open stacks, but the rare and valuable possessions of the manuscript library are placed under lock and key in specially constructed cases provided with glass doors. The shelves in these cases are of the skeleton steel type and adjustable, being 24 inches deep in the lower compartments and 15 inches deep above.

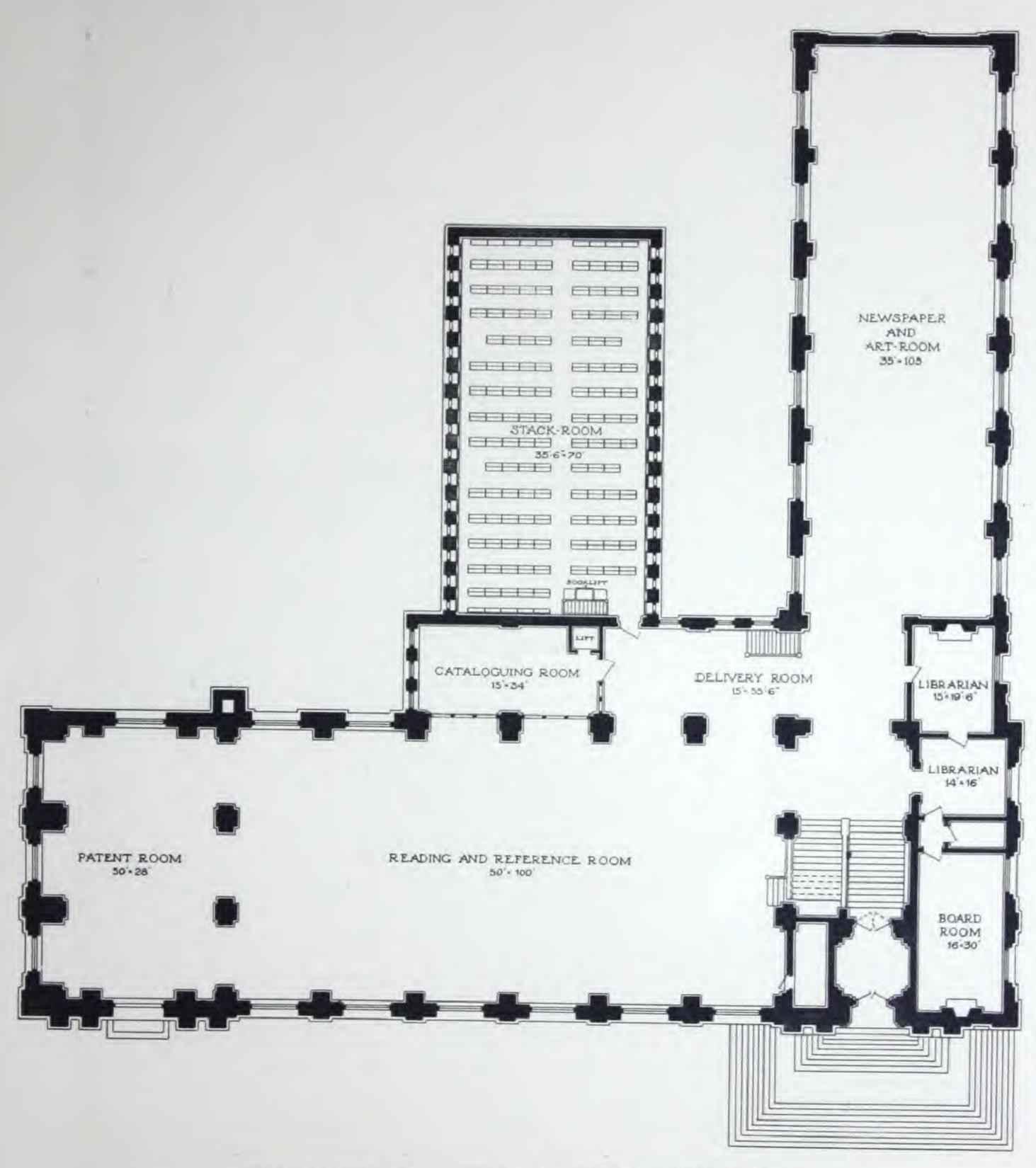
The manuscript library room is fireproof, having no windows, and is lighted from above. It contains more than 12,000 volumes, constituting the largest collection of rare Hebraica in the United States and the fourth largest in the world.



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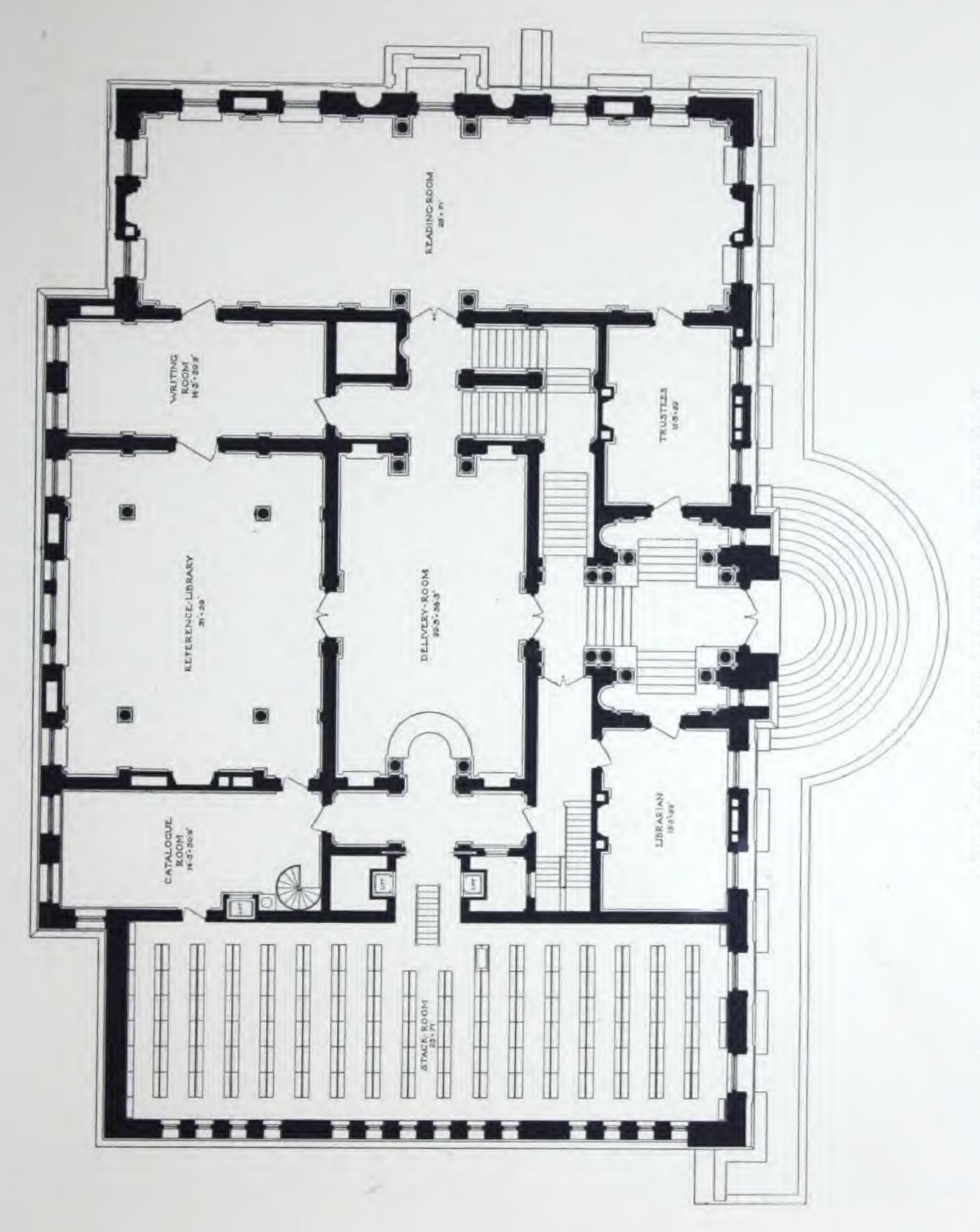
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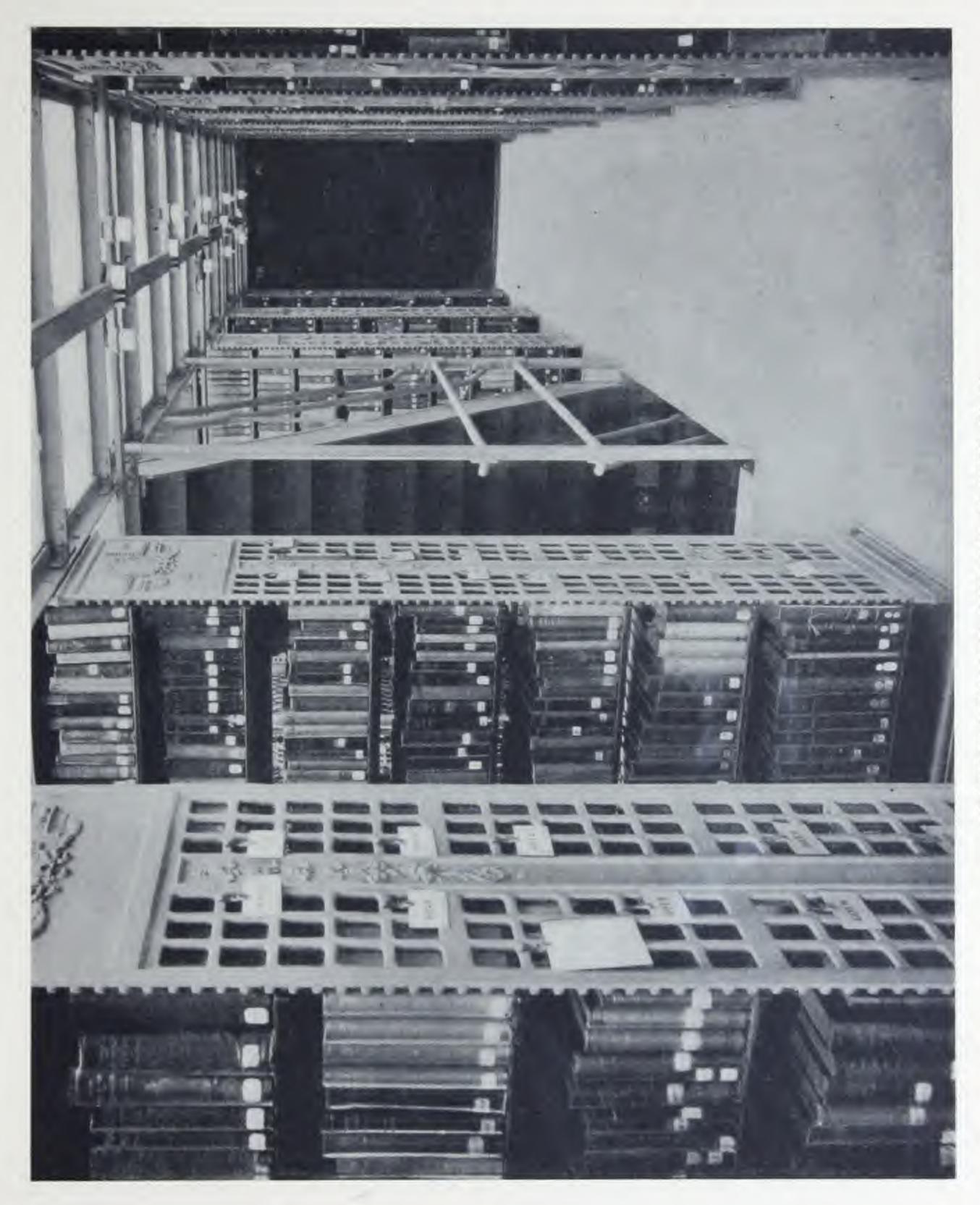
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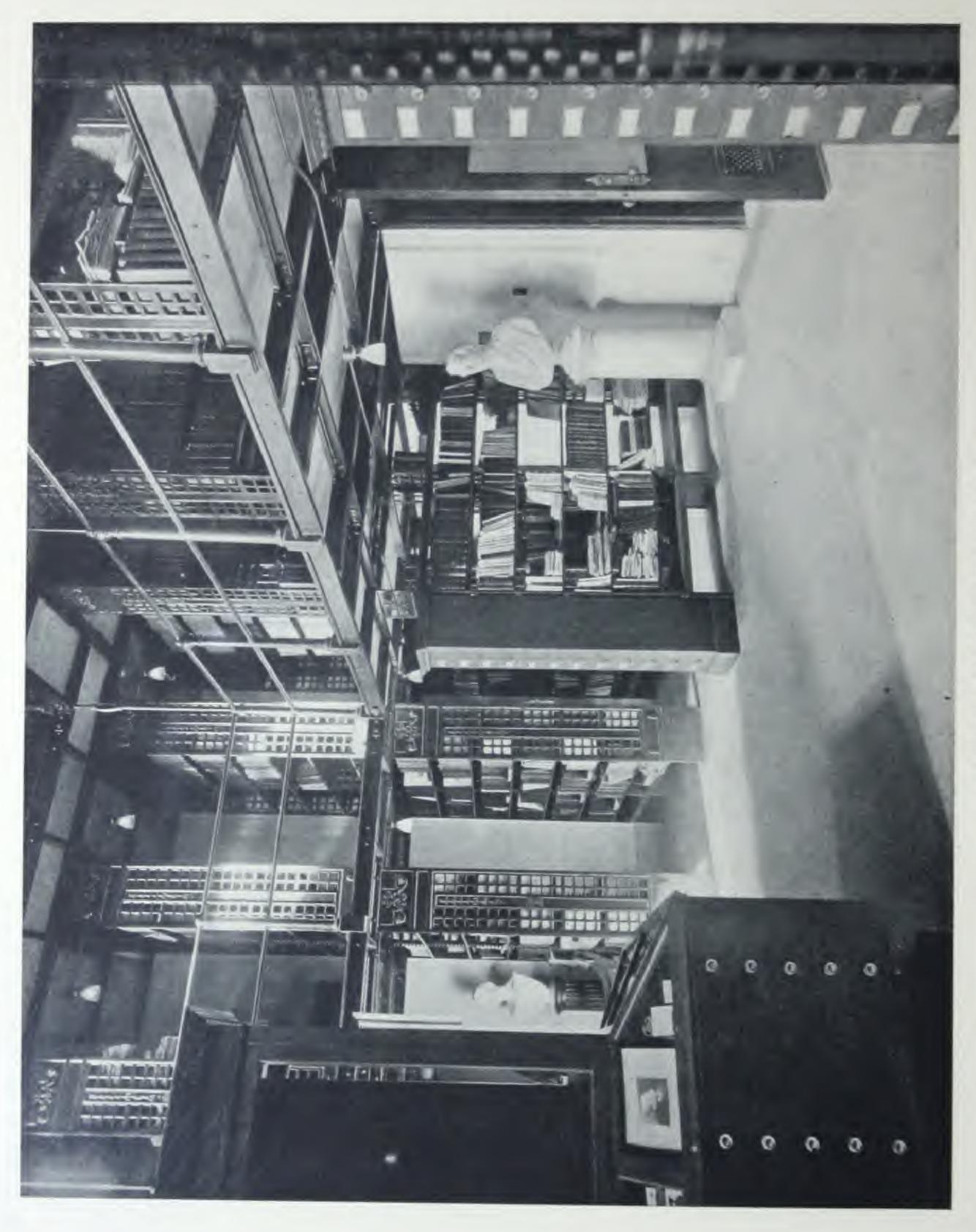
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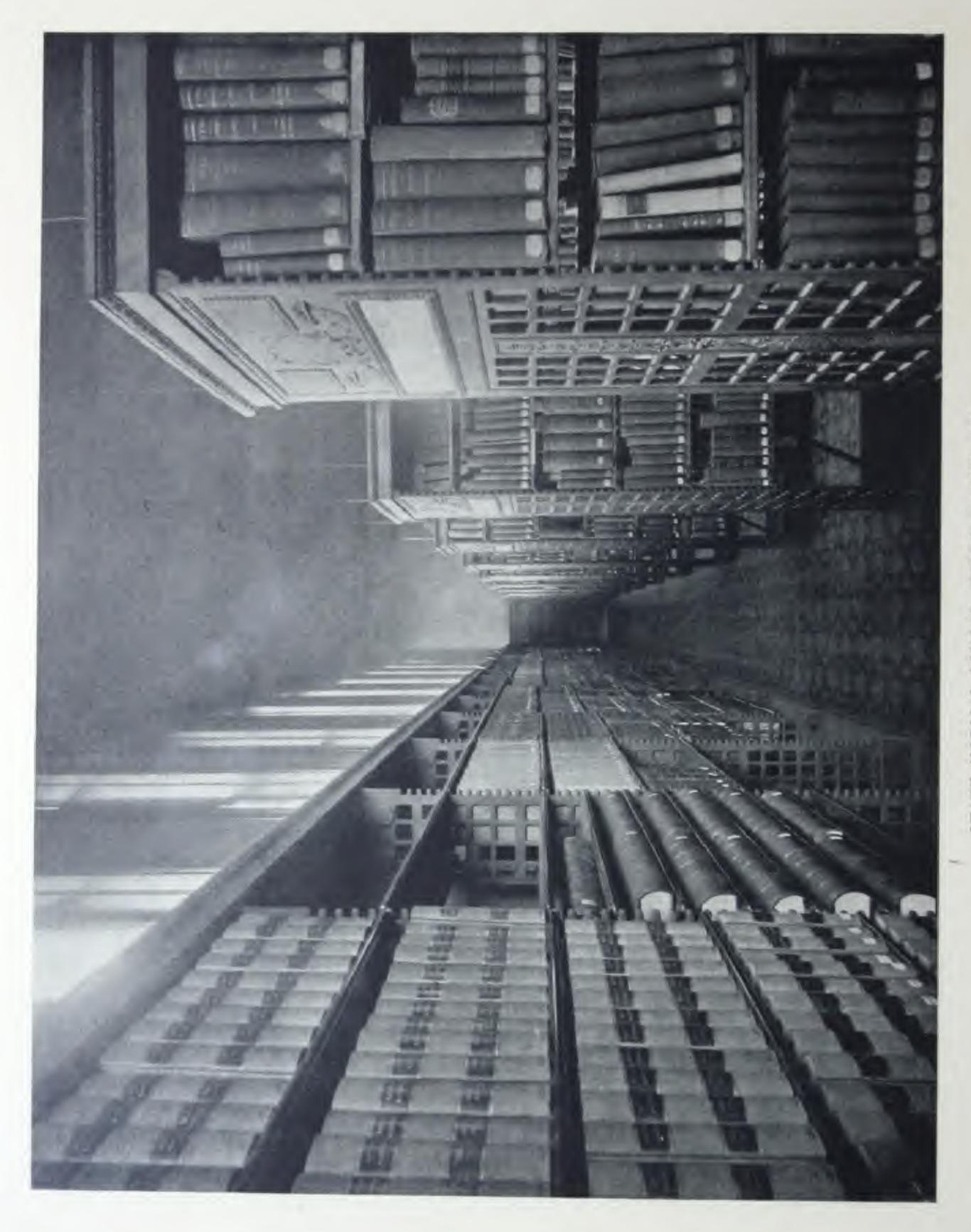
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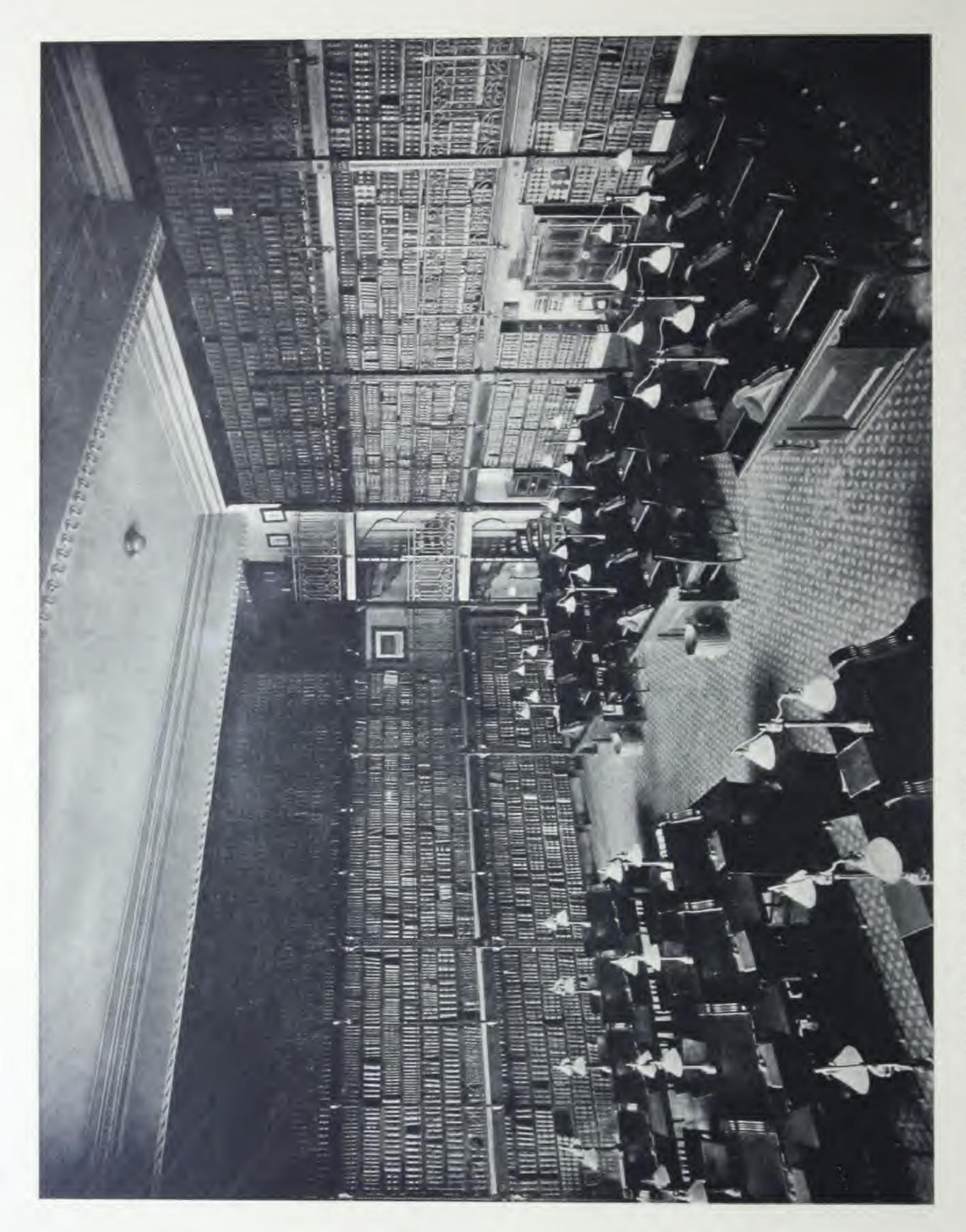
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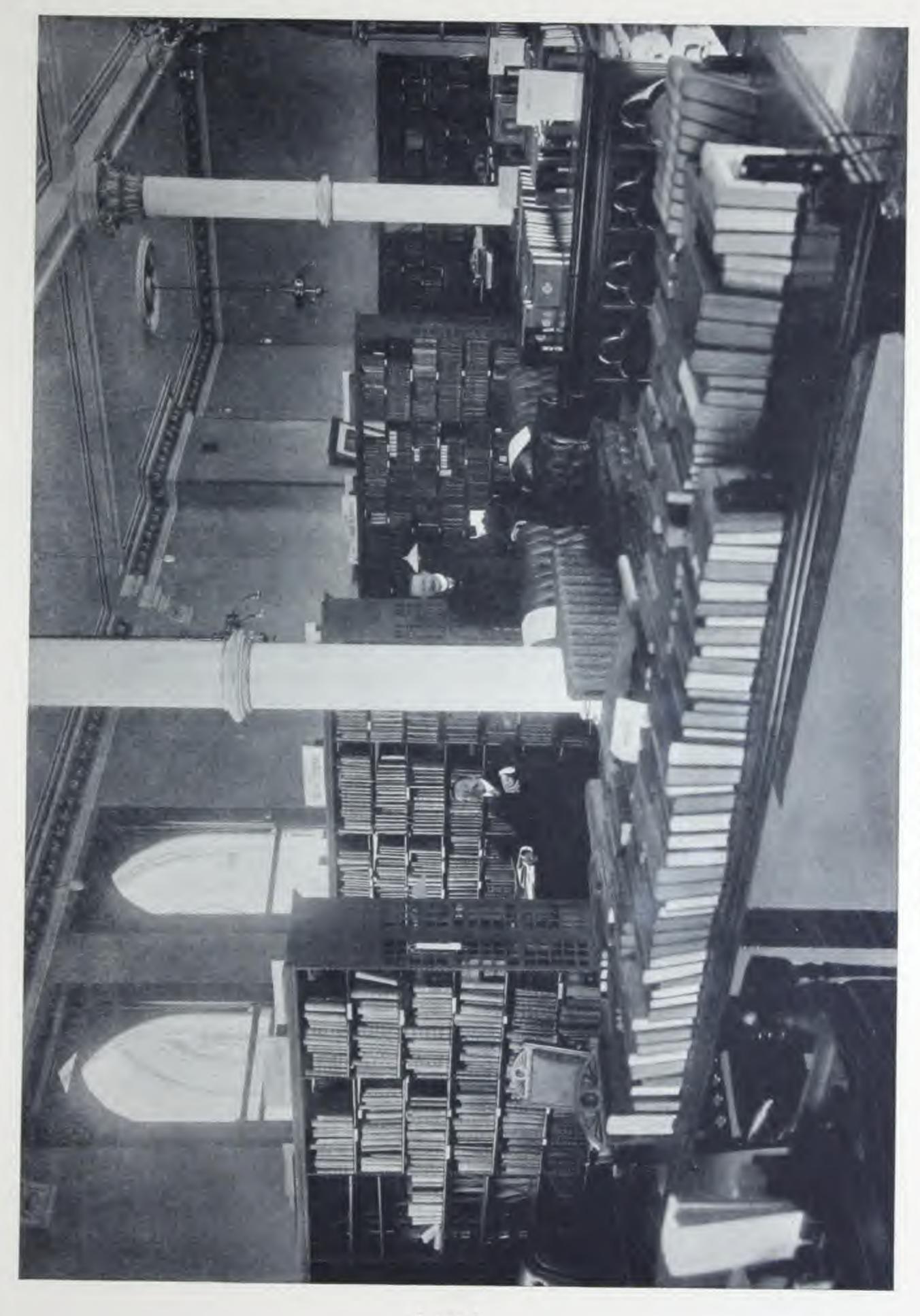
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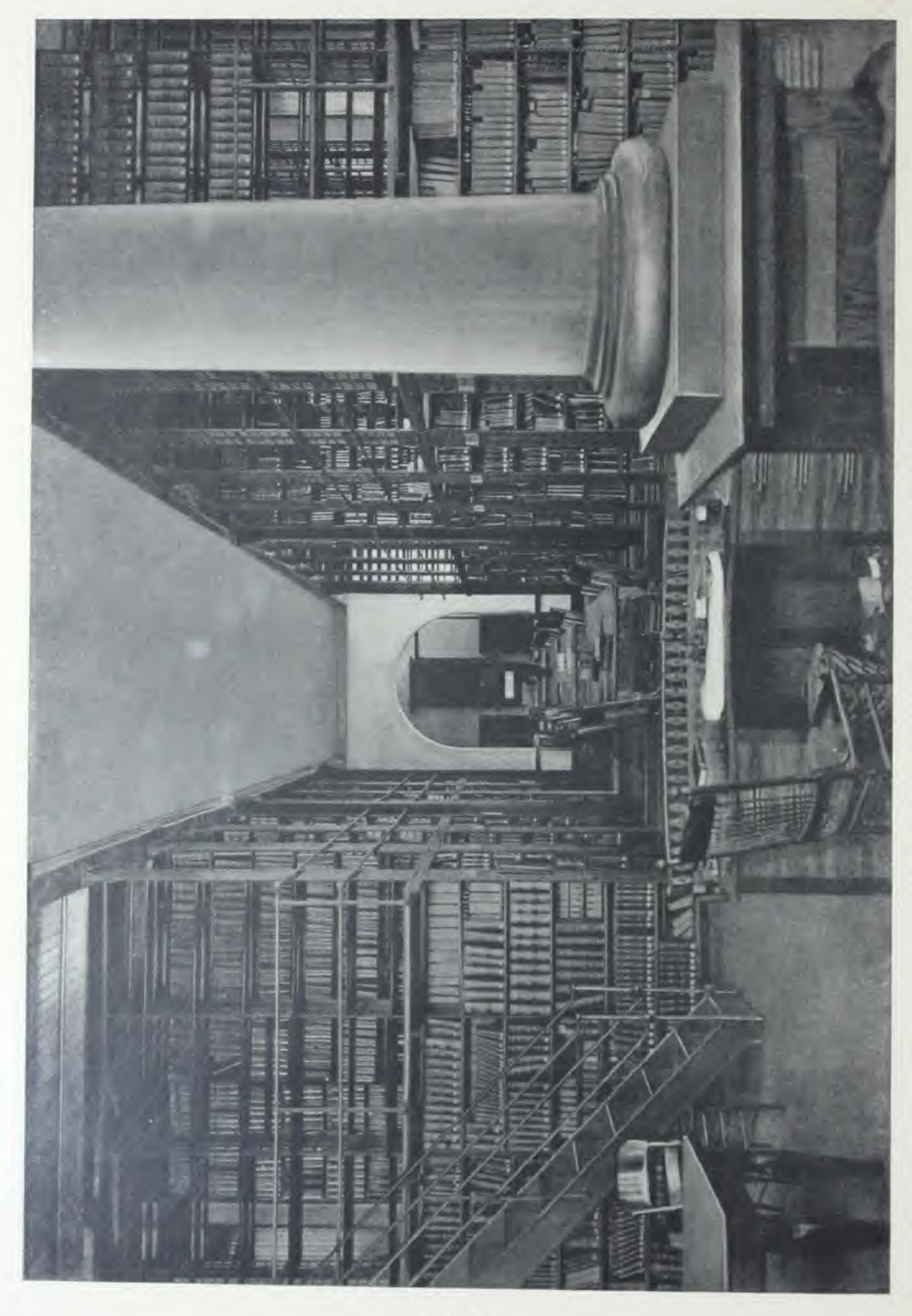
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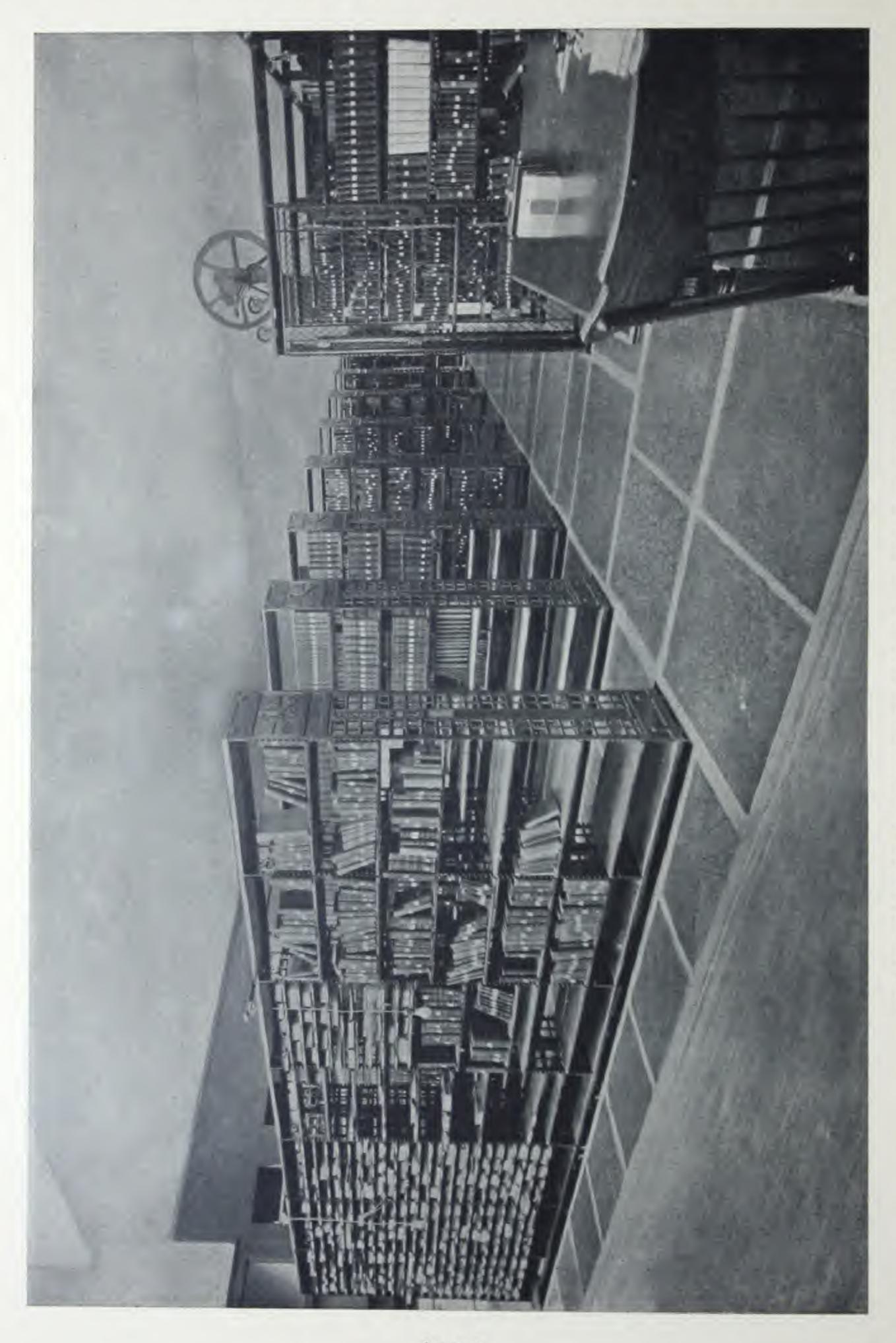
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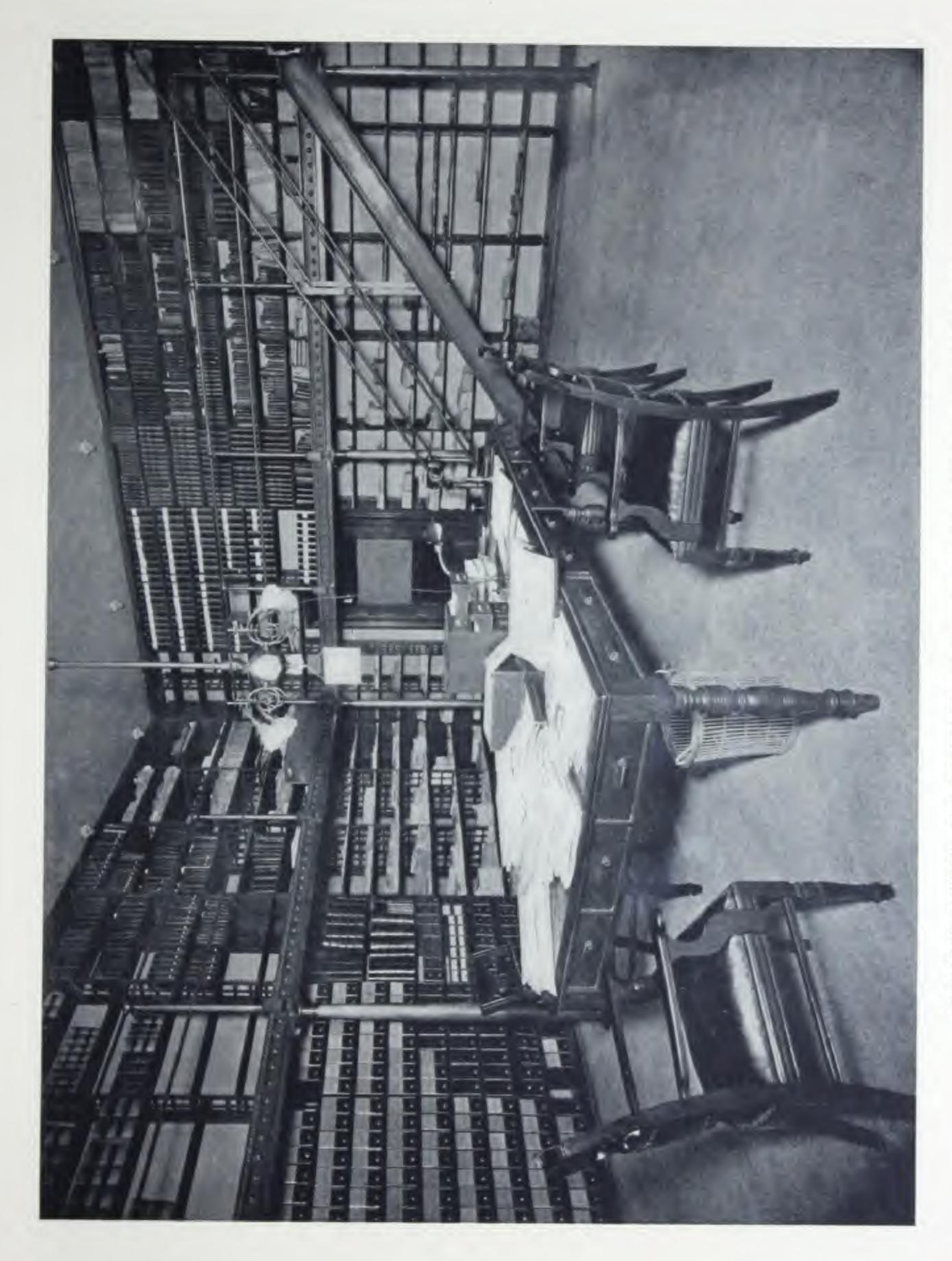
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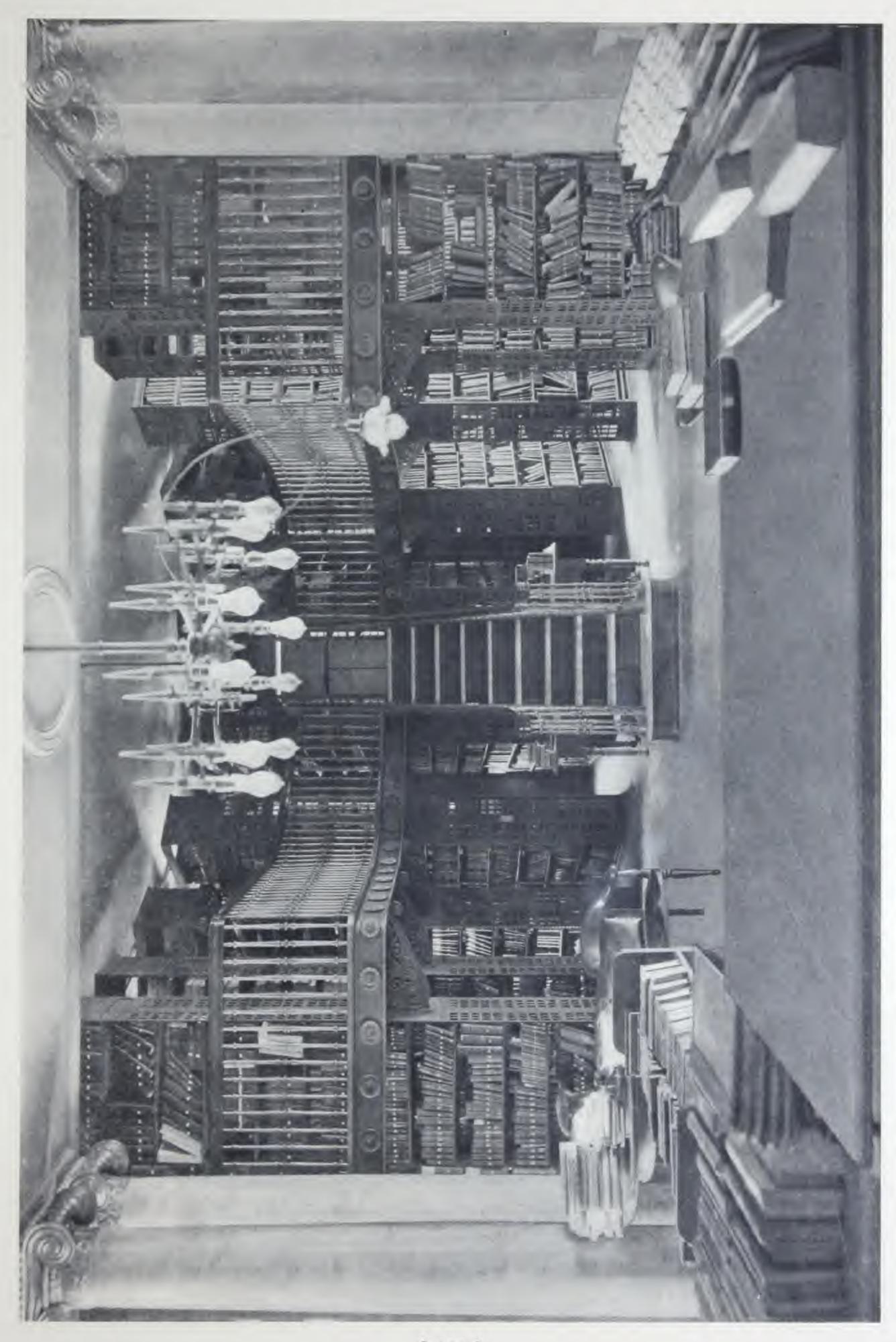
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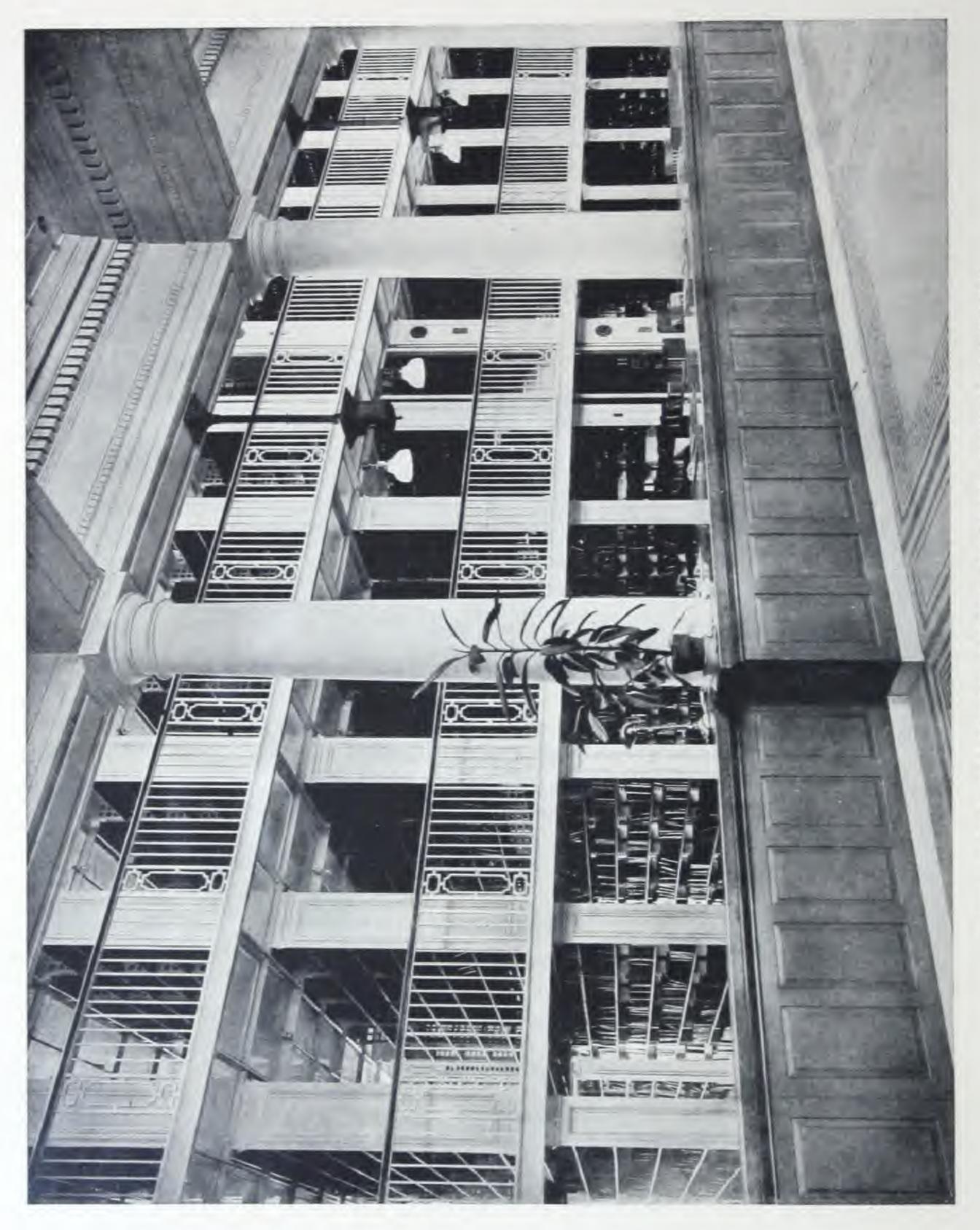
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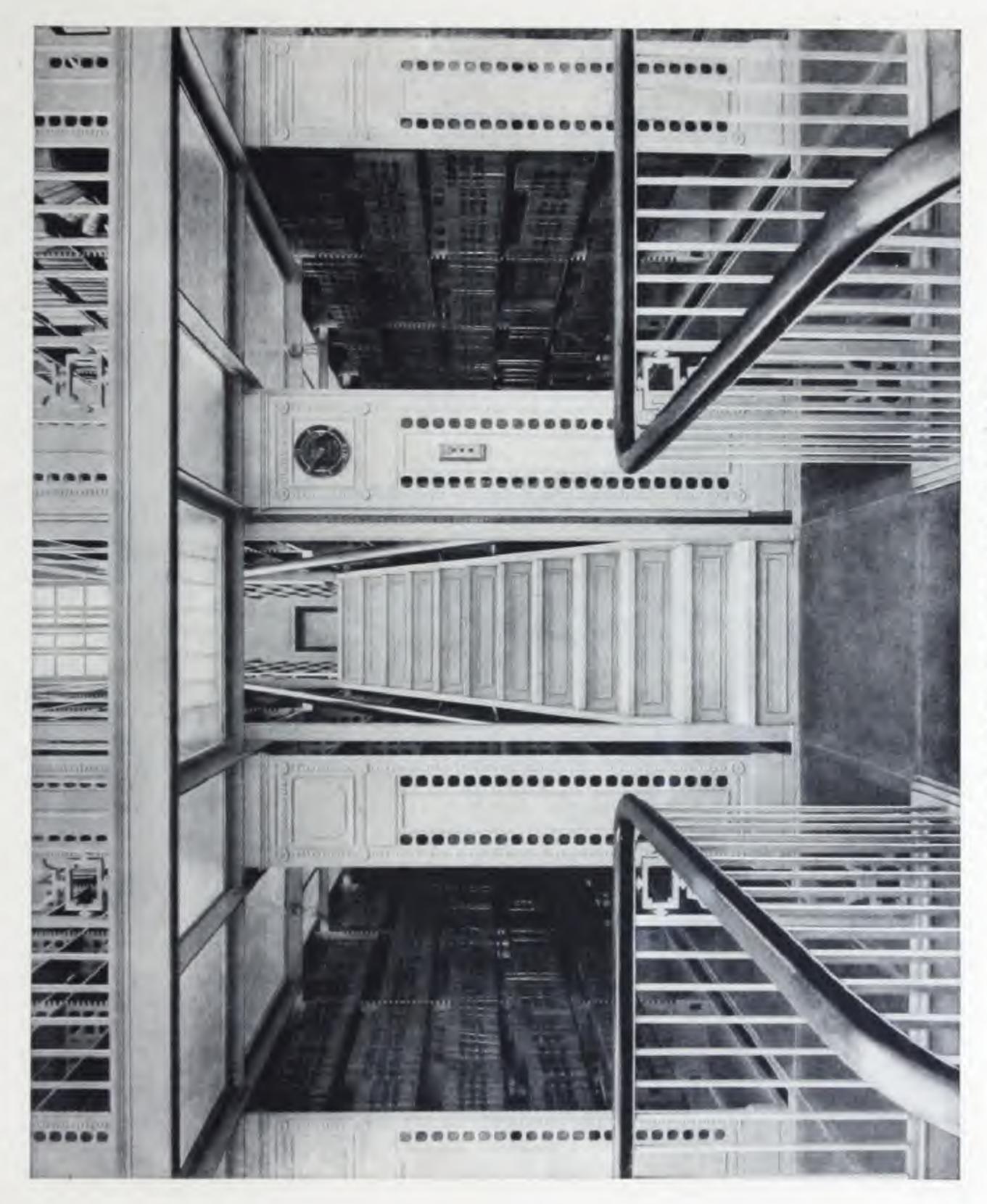
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